The Electrical Industry's Weekly Magazine

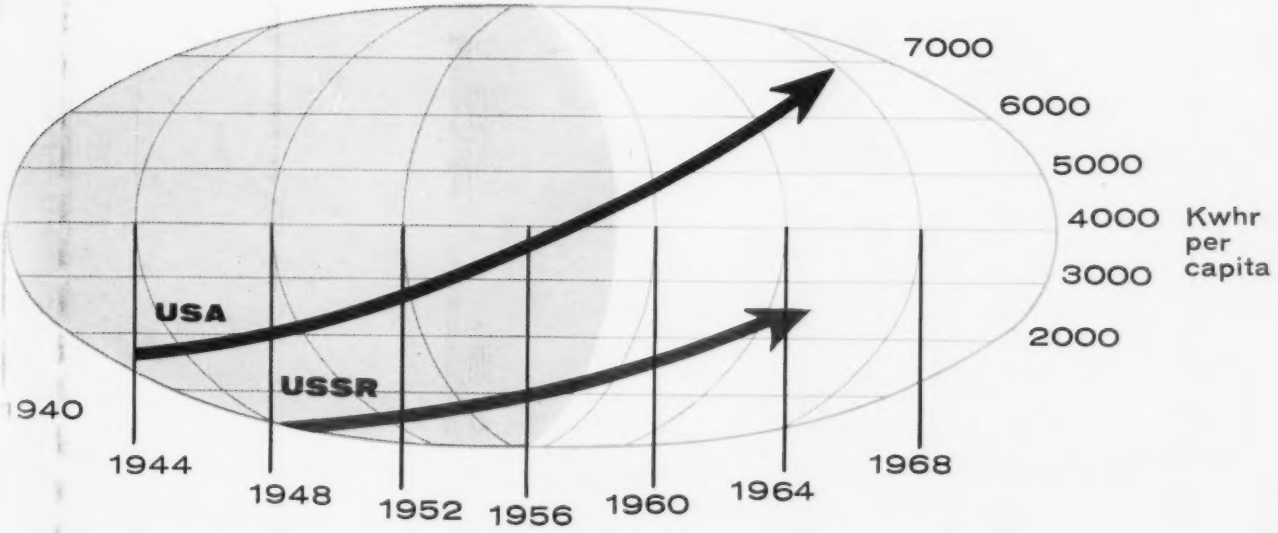
April 20, 1959

Electrical World

Price 50 Cents

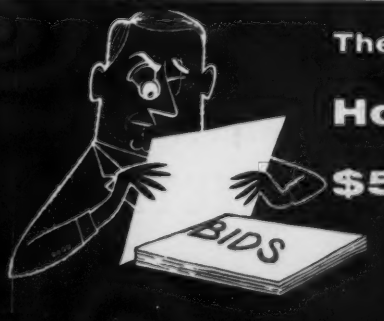
A McGraw-Hill Publication

27th ANNUAL CONVENTION



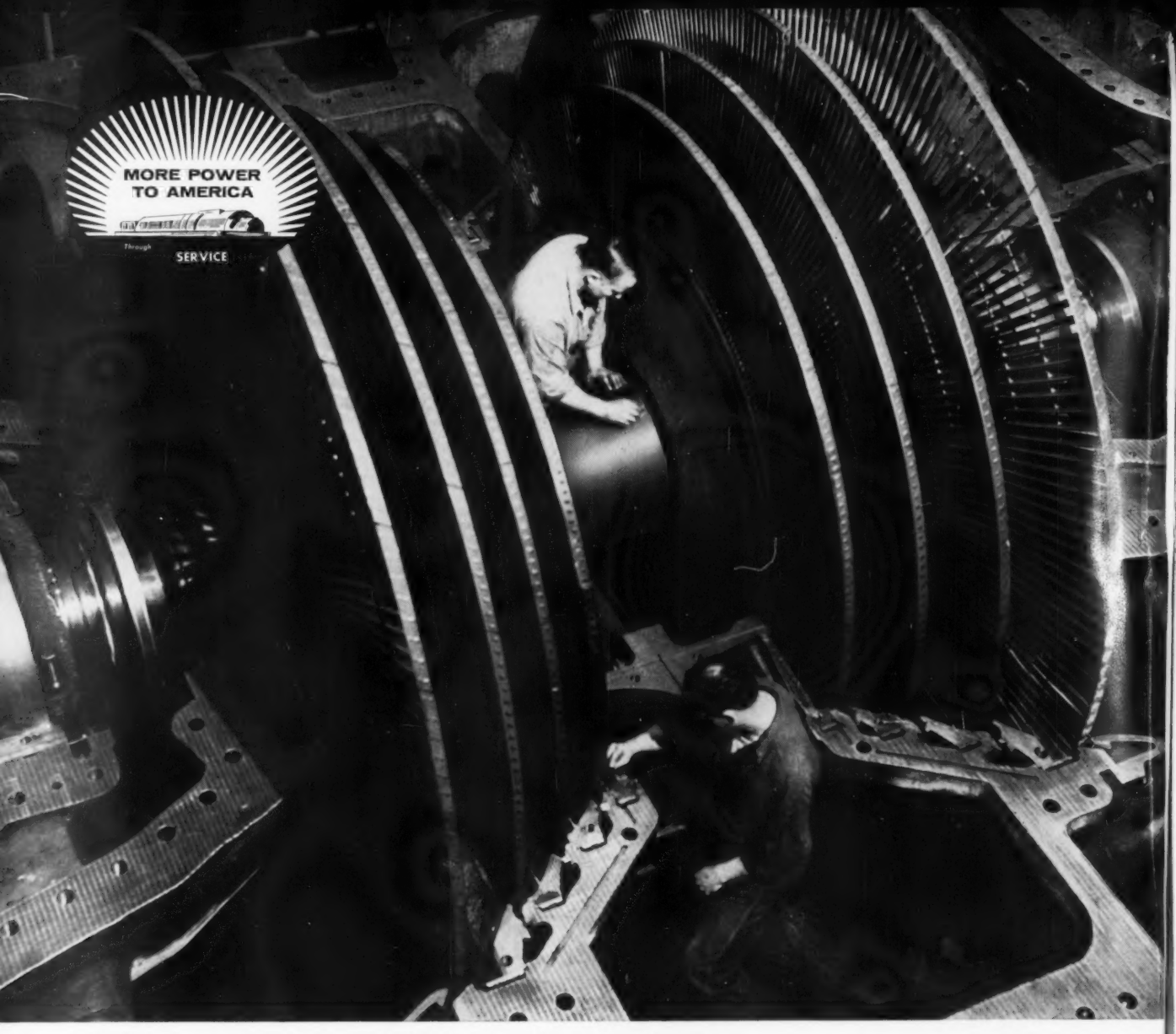
'More Power for a Strong America'

...p 83



The Utility Purchasing Agent:

How he helps spend $5 billion a year



Turbine-generator *reliability* is the result of . . .

KNOW-HOW AND SERVICE

Reliability contributes to determining the cost of power generation and the need for system reserve capacity. A unit's reliability becomes increasingly important as larger-capacity turbine-generators are added to a system.

KNOW-HOW—General Electric steam turbine-generators are continually demonstrating the outstanding reliability designed and built into each unit. Engineering and manufacturing know-how and skills at General Electric contribute to this product leadership.

SERVICE—This built-in reliability is protected and maintained by experienced service guidance. General Electric's nationwide turbine-generator field service team—853 engineers and specialists with a combined total of 5,458 man-years of turbine-generator service experience—help keep power makers on the line. Backing up this skilled service team are the manufacturing and engineering capabilities of some 7,000 turbine-generator people at the factory, as well as 50 General Electric Apparatus Service Shops located strategically across the nation.

FACTOR IN NATIONAL SECURITY—Reliable power generation is vital to national security. Recognizing this, General Electric facilities and manpower respond to the needs of electric utilities day in and day out. Whether it be planned or forced outages, natural disaster, international conflict, the General Electric Company is prepared to render prompt, expert service . . . to diagnose, repair or replace power generation equipment.

For more information on these General Electric capabilities, write for Bulletin GED-3666, "Keeping Power Makers on the Line." General Electric Company, Section 301-403, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Electrical World

Vol. 151, No. 16 APRIL 20, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

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CURRENT EVENTS

Capital Spending Upturn Is Under Way

Expenditures by all business slated to rise 7%, with bulk of it for modernization. Utilities plan 2% rise.....p 76

Battery Makers Take Electric Car Seriously

Several firms are bullish on prospects for cars and trucks. Separate-cell batteries, prototype car debut.....p 78

DISTRIBUTION

23-Kv Distribution Proves Out

E. M. Geddie, Carolina Power & Light Co

Experience of Carolina P&L over 14 years shows improved economy, continuity, regulation, and fewer tree problems..p 106

A Staff Report

p 83

Full Report on 27th EEI Convention

Russian economic threat—and the responsibility to meet it with "electric power for a strong America"—is recognized as the number one problem of electric industry leaders at the EEI convention in New Orleans. Other classic problems treated include government encroachment, customer education, sales, system planning, rates, and financing. One new twist: Companies are told to encourage their employees to become more active in politics. In exclusive interview, new EEI President Allen S. King says his pet objective is to "build an industry image like the individual company images".....p 83

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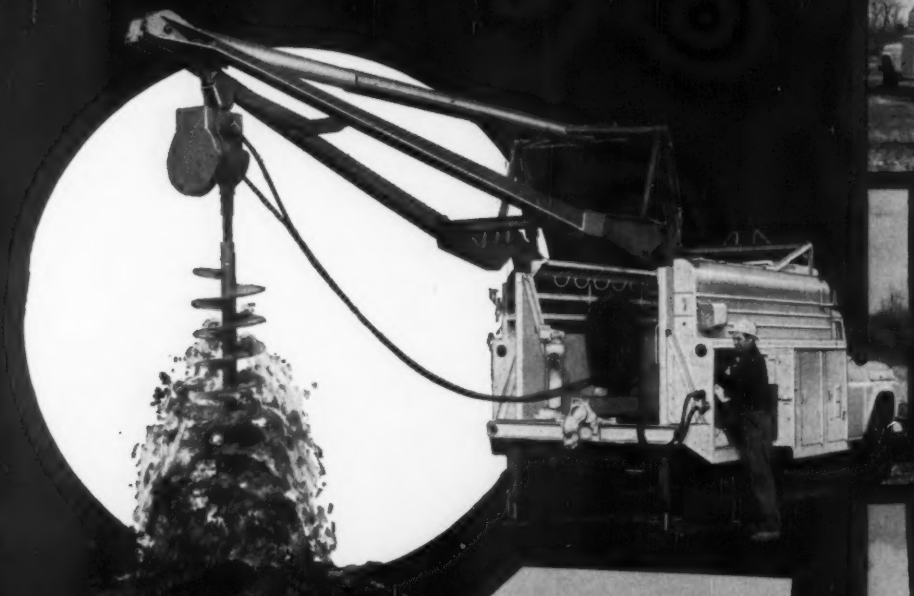
NEW SERIES DF-1

"Earth-Master"

PORTABLE HYDRAULIC HOLE DIGGER



PRICED TO FIT THE MOST MODEST BUDGET

This new Series DF-1 "Earth-Master" digs straight, clean holes—up to 20" in diameter and 10' in depth—in practically any type of soil. It digs close to poles, fences and buildings, reaches areas inaccessible to "fixed position" units, swings out of the way to permit unrestricted use of the derrick and can be easily transferred to another vehicle.

Like all portable diggers in the "Earth-Master" line, the DF-1 is designed for use with a "live boom" hydraulic derrick, such as the Series PM-1 "Pole-Master" shown. Down pressure which can be applied with the derrick teams up with natural feed of the auger to facilitate digging in extremely hard soil.

The DF-1 is powered by a hydraulic pump driven by the truck engine. Rotation is accomplished by a reversible hydraulic motor through a chain and sprocket assembly. Control lever, installed next to derrick controls in right rear compartment of body, is available with built-in engine speed regulator.

Standard full-flight auger, with Pengo head having replaceable points, can be furnished in sizes from 9" to 20" in diameter.

Complete details and prices are yours for the asking!

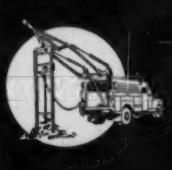
Another reason why...
UTILITIES EXPECT MORE FROM

POWERS *American*

UTILITY BODIES AND EQUIPMENT

SERIES EM-1 "Earth-Master" digs holes from 9" to 20" in diameter, as deep as 9'4", vertically or at various angles. Auger is gunted at all times, feeds and rotates under power.

SERIES EM-2 "Earth-Master" handles the work of a "fixed position" boring machine. Guided auger feeds and rotates under power, digs straight clean holes up to 30" in diameter, up to 10'6" deep, vertically or at angles.



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Setting A Good Example

Enabling legislation that would let New York City's Transit Authority sell its three power plants and buy power to operate New York's subways from Con Edison has passed the state legislature and awaits signature at this writing.

To reach this point the Mayor's Special Committee and the City's Board of Estimate have endorsed the plan in the face of pressures from a transit labor group.

In taking this step the city has not only exhibited political courage in an area where it has been formerly lacking, but has shown sound business judgment and far-sighted fiscal prudence. With this plan the city is taking the necessary first steps to:

- Turn costly, tax-exempt operation into a tax source
- Put the responsibility for adequate, continuous subway power supply in the hands of an eminently qualified organization
- Paved the way for eliminating one of the most consistent and flagrant violators of its smoke ordinances—its own plants
- Get the city transit authority out of the power generating business

These actions by the World's largest city set an outstanding example of good business judgment.

Fischer Black

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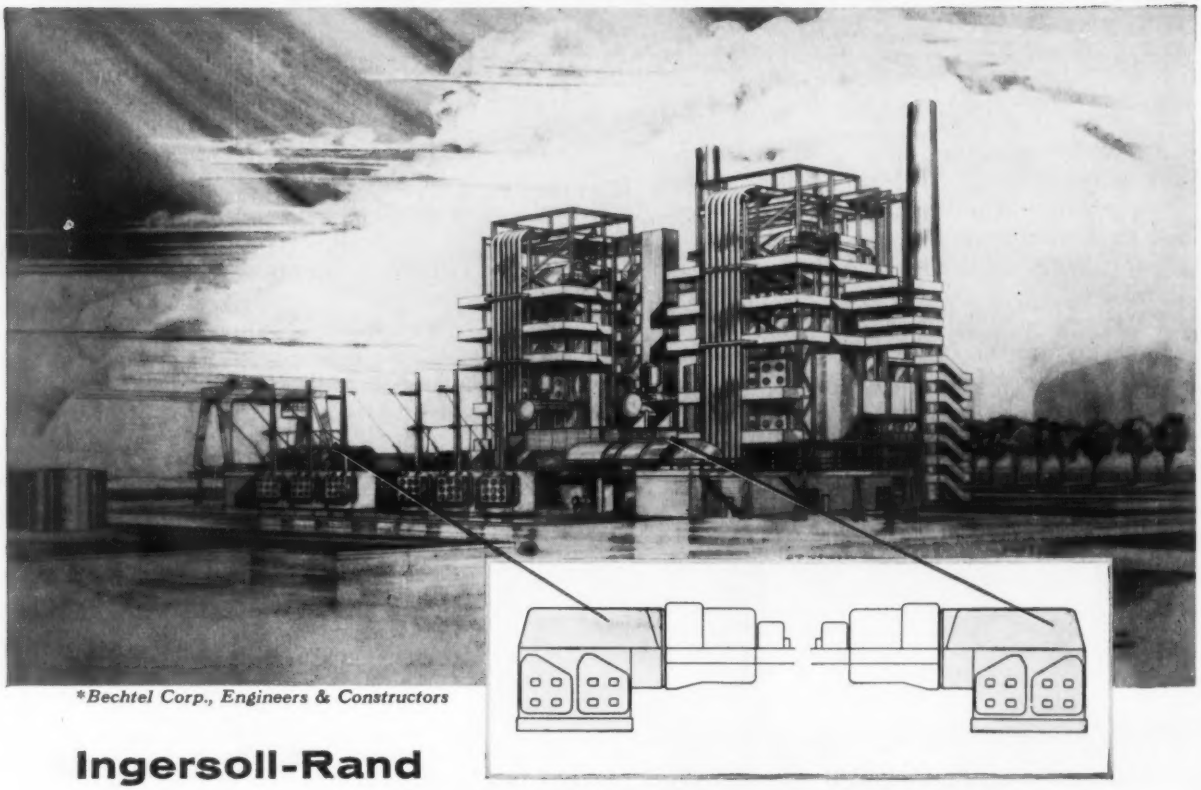
For Southern California Edison Company's new Huntington Beach Steam Station*...



*Bechtel Corp., Engineers & Constructors

Ingersoll-Rand

axial-inlet condensers will serve each 200 MW unit

Designed for an eventual four units, the first two units of the new Huntington Beach Steam Station are now under construction. Turbines are cross-compound axial exhaust, 2400 psig., 1050°/1000°, 3600/1800 rpm. As indicated above in the artist's rendering, these units will be served by axial-inlet condensers, specially designed for this installation by Ingersoll-Rand. These I-R condensers are 2-pass units, each with 110,000 sq ft of surface.

In addition to the surface condensers, Ingersoll-Rand is furnishing the following associated equipment:

5 boiler-feed pumps rated 2020 gpm at 6400 ft TDH.

4 vertical condensate pumps, 3-stage, rated 2500 gpm at 350 ft TDH.

5 condensate booster pumps, rated 1851 gpm at 1970 ft TDH.

4 vertical condenser circulating pumps, rated 44,000 gpm at 35 ft TDH. The columns and discharge head sections are lined with Fiberglas.

2 steam-jet ejector units, 2-stage, single-element with surface-type inter and after condensers.

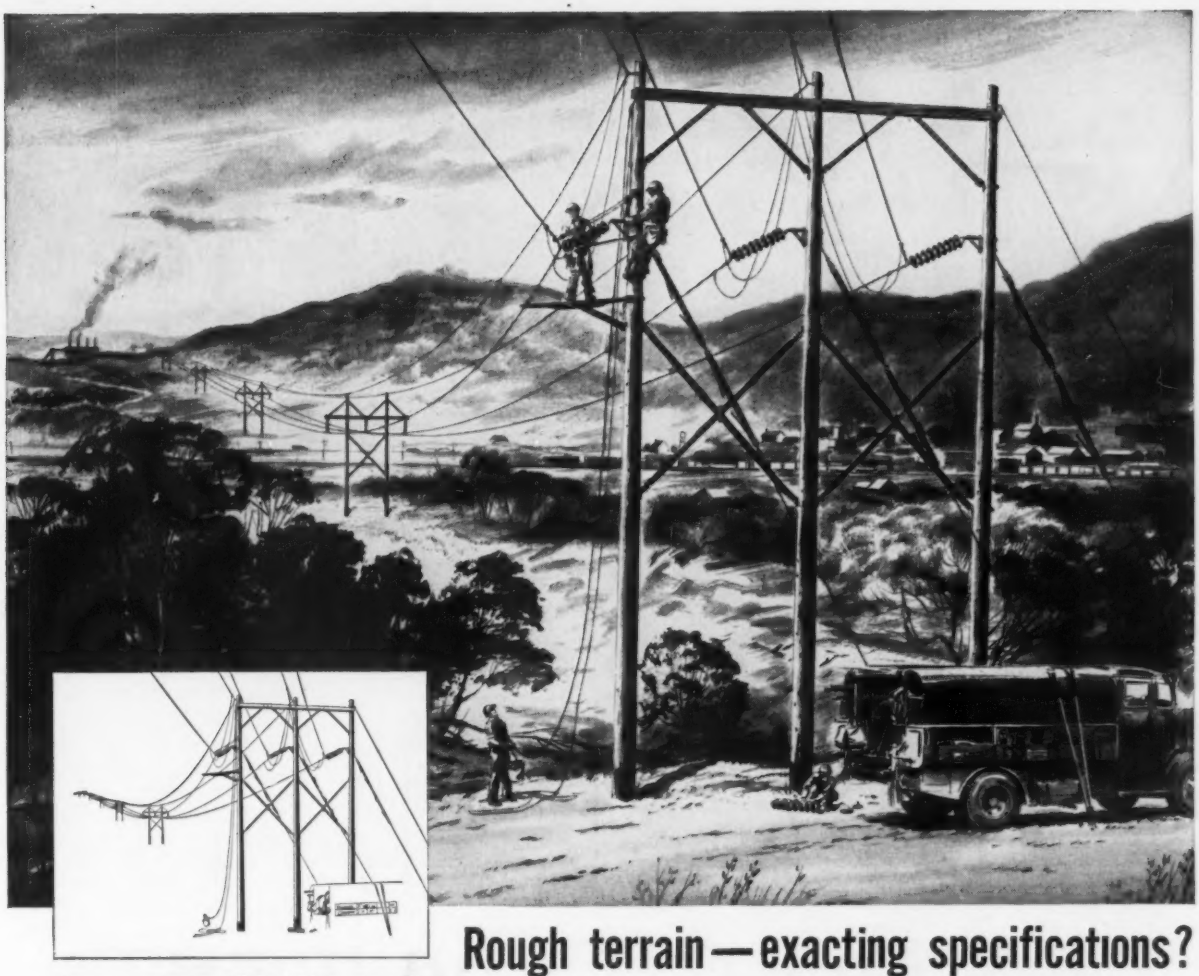
2 horizontal reciprocating vacuum pumps each driven by a 100 hp electric motor.

This installation is another dramatic example of Ingersoll-Rand's ability to meet the requirements of the modern steam plant... with advanced design surface condensers, pumps and associated equipment. Your I-R engineer will be glad to help you determine the equipment best suited to *your* requirements.

Ingersoll-Rand

4-874 11 Broadway, New York 4, N. Y.

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN ENGINEERED PRODUCTS



You can get prompt help with any outside construction problem through your Graybar office. In over 130 cities there are Graybar offices and warehouses ready to fill your every need for line materials, hardware and tools. And through any of these offices you can get the help of Graybar Outside Construction Specialists, strategically located in 19 principal cities, equipped by training and experience to give you prompt, dependable help.

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Line building can challenge the skill and ingenuity of the best transmission engineers. When the line runs through rugged country, when the specifications are precise, take full advantage of the broad facilities and specialized experience of Graybar. No matter where your job site may be located, no matter what new requirements may be presented in tensions, insulation and erection, call on Graybar for engineering assistance as well as all your transmission line materials and supplies. If you would like to see our bulletin on High Voltage Transmission Line Materials, and you are located in the U. S. or its possessions, write us for your copy. It's complete with illustrations, applications and specifications. It is free, of course. 710

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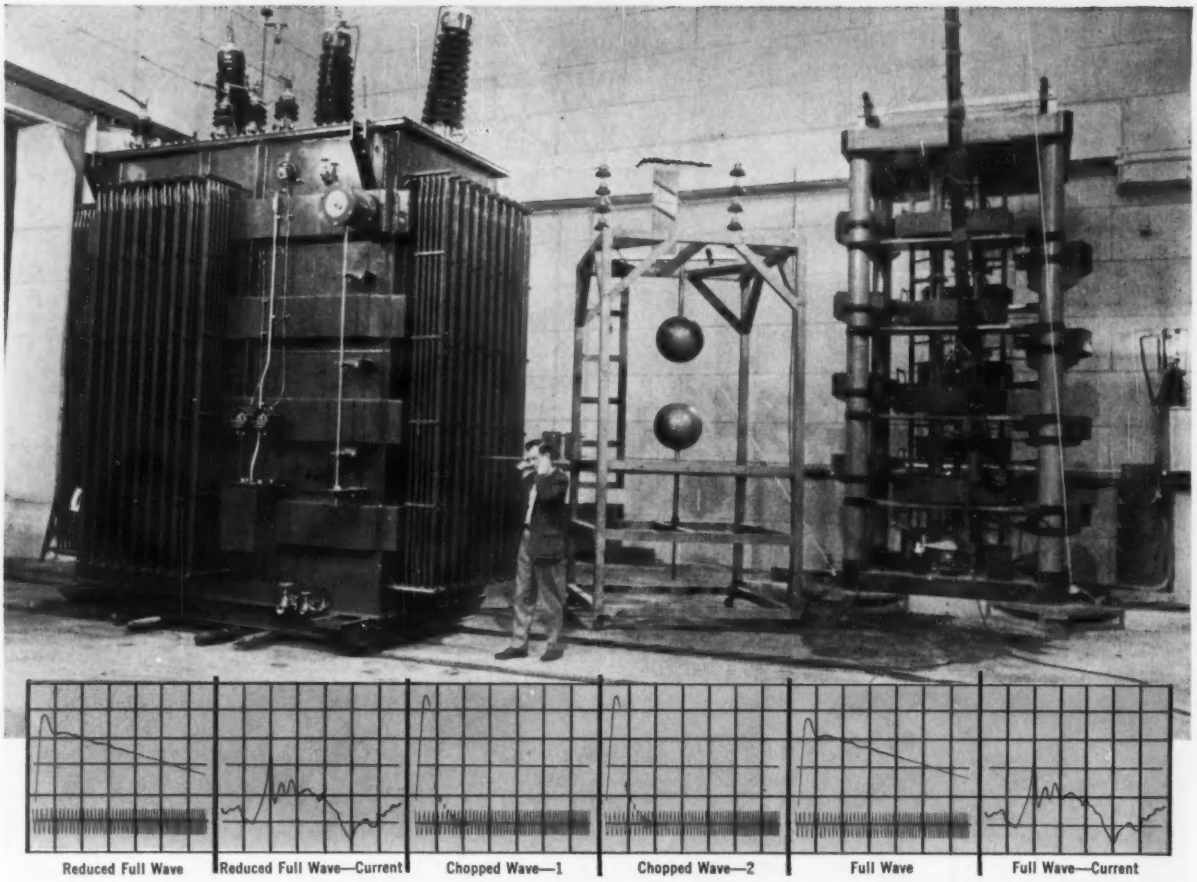

RESEARCH and TEST...

Your Guarantee of Modern Design, Top Quality in Central Power Transformers!

As part of a stepped-up research and development program, Central announces the addition of a new Research and Test Laboratory.

The insulated laboratory building, isolated from the main plant, houses much new equipment which is being used primarily for research in the reduction of transformer noise levels.

The new Laboratory also houses Central's modern 1,600,000-volt impulse generator to facilitate testing under controlled atmospheric conditions.

Central's expanded research program covers all areas leading to new and improved techniques related to every phase of transformer manufacture.

Just one more reason why Central Transformers are **PREFERRED** *throughout the Nation*

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NEMA

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(Tapeless Underground Connector)

More COMPACT
More RELIABLE
LOWER in COST

MICON is a Dossert Mfg. Corp. trademark for a tapeless underground connector especially designed for residential and industrial underground distribution systems. This brand of connector is fully insulated for joining up to 8 electrical cables where watertightness must be insured. MICON tapeless connector is simple in concept and well proven principles have been used in its design. No extra components are needed to accommodate a wide range of cable sizes in any outlet position.

MICON brand tapeless connector has many outstanding features and advantages which constitute a substantial improvement over older style and competitive fittings. The most important ones are:

- Lower cost of complete fitting.
- Less field time required for installation.
- Wide cable range without accessories.
- No plastic parts to crack or chip.
- No extra bushings required to fit different insulations.
- All parts are designed for easy accessibility and easy installation.
- Compact design conserves manhole space.

Dossert MICON brand tapeless Crab-type Connector is especially designed for joining up to 12 electrical cables. This connector is an original Dossert design and adheres to the same principle as the tapeless type. Write for special catalog.

Request also complete UNDERGROUND CATALOG UG 53-1

*Pat. Pend. Reg. Trade Mark applied for

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Look at the record

BROWN BOVERI

Year after year BROWN BOVERI has opened new vistas in extra-high voltage equipment and applications. Today BROWN BOVERI can point to 2,450,000 KVA in EHV transformer capacity delivered or on order. More than 133 air-blast circuit breakers rated 300 KV and above have been in successful operation for years both in North America and Europe.

A record of world-wide confidence in BROWN BOVERI EHV transformers and air-blast circuit breakers has been established through actual use and top performance. Maximum design voltage of most of this transmission equipment is 460 KV. Pioneering research and development of transformers and air-blast breakers rated up to 650 KV is in progress at BROWN BOVERI.

In your system planning, it may pay you to consider BROWN BOVERI'S unmatched background in the field of extra high voltage.

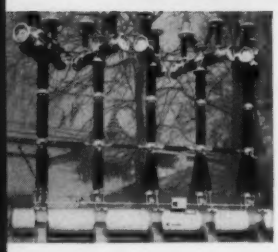
The complete record is yours for the asking.

EHV TRANSFORMERS

Client and Shipping Date	KVA and Voltage Rating
Krangede AB Sweden 1956	two banks 130 MVA each, 13.8/400 kV step-up generator transformers
Kraftwerke Hinterrhein Switzerland 1957	two banks 400/280/187 MVA 420/201/10 kV *regulating* auto-transformers
RWE Germany 1958	one bank 660 MVA, 400/230/30 kV *regulating* auto-transformers
EDF France 1958	one bank 300 MVA, 380/230/10 kV
Imatran Voima Oy Helsinki, Finland 1960	four single-phase three-winding auto-transformers, three-phase bank rating 420/420/55 MVA, 380/238/20 kV

EHV AIRBLAST CIRCUIT BREAKERS

Client and Date of Order	Quantity	MVA & Voltage Rating	
KVS Sweden 1951	10	10000	400 kV
Kamijoki Finland 1955	2	10000	380 kV
Quebec Hydro 1954	23	10000	300 kV
Imatran Voima Oy Finland 1956	2	10000	380 kV
Quebec Hydro 1956	39	10000	300 kV
Imatran Voima Oy Finland 1957	5	10000	300 kV
Imatran Voima Oy Finland 1957	1	15000	400 kV
American Electric Corp. 1957	2	25000	345 kV
RWE Germany 1957	2	15000	400 kV
Aluminium Co. Canada 1957	4	15000	300 kV
Krangede AB Sweden 1957	2	15000	400 kV
Aluminium Co. Canada 1957	5	10000	345 kV
Aluminium Co. Canada 1957	4	10000	345 kV
Aluminium Co. Canada 1957	5	10000	345 kV
Motor Columbus Switzerland 1957	2	15000	400 kV
Imatran Voima Oy Finland 1957	3	15000	400 kV
KW Vorderrhein Switzerland 1958	6	15000	400 kV
Kemiyoky Oy Finland 1958	1	15000	400 kV
Electricity Supply Commission South Africa 1959	16	15000	275 kV



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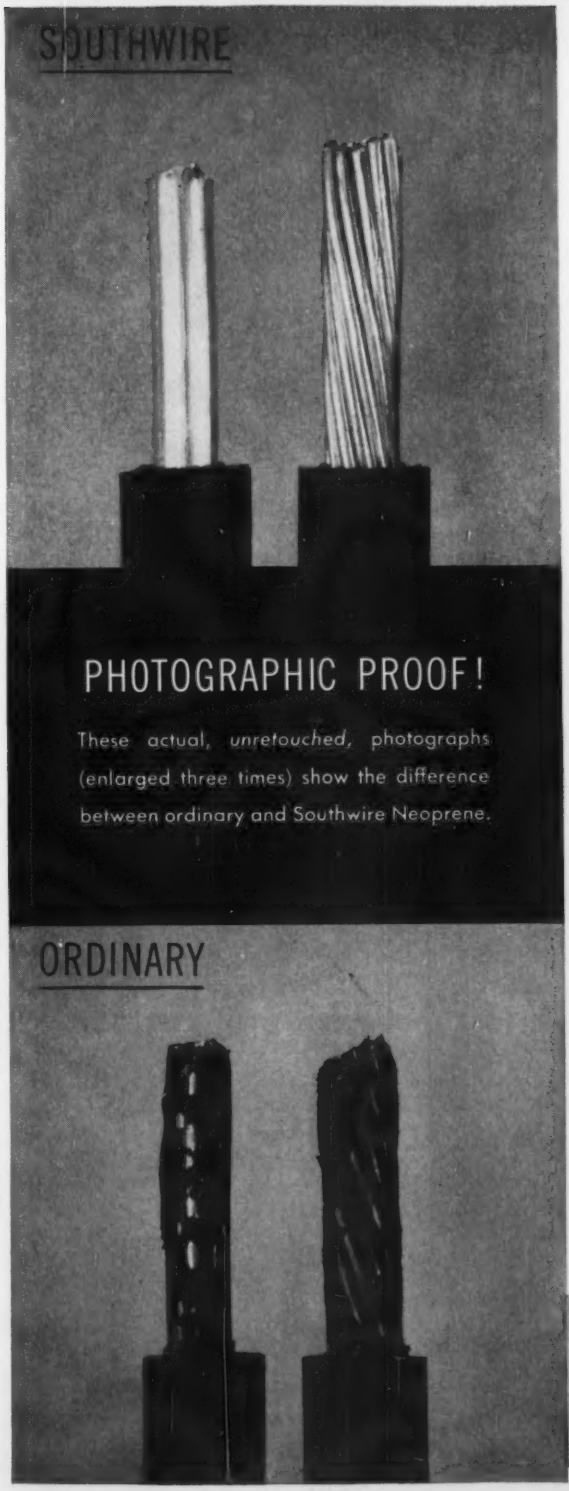
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PHOTOGRAPHIC PROOF!
These actual, *unretouched*, photographs (enlarged three times) show the difference between ordinary and Southwire Neoprene.
ORDINARY

SOUTHWIRE

NEOPRENE COVERED COPPER

Get what you pay for when you order free stripping Neoprene Covered Copper Wire and cable—not just some of the time, but every time!

Southwire's compounding and extruding techniques, developed only after long and exhaustive testing, are your guarantee of premium quality—and long, trouble-free conductor performance.

Southwire Neoprene is consistently 100% free stripping. It will not stick—even to stranded wire. It will not discolor the copper. Wires need no scraping before connections are made.

And there is no premium in price for this superior product—another Southwire first!

- **NO STICKING — NO DISCOLORATION**
- **NO SCRAPING NEEDED FOR CONNECTIONS**
- **NO PREMIUM IN PRICE**

FREE SAMPLES AND TECHNICAL DATA ON REQUEST

SOUTHWIRE serves the world

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
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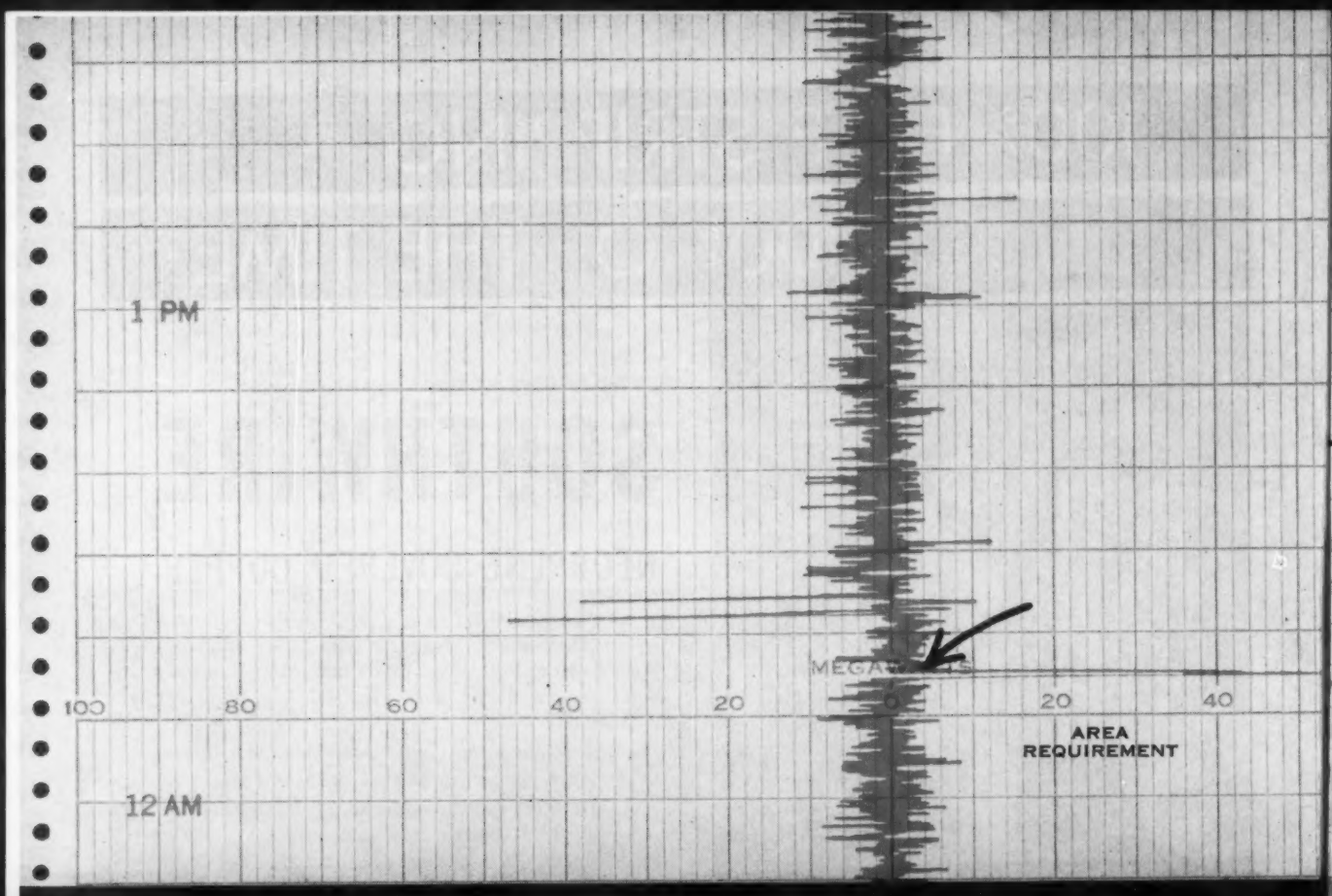
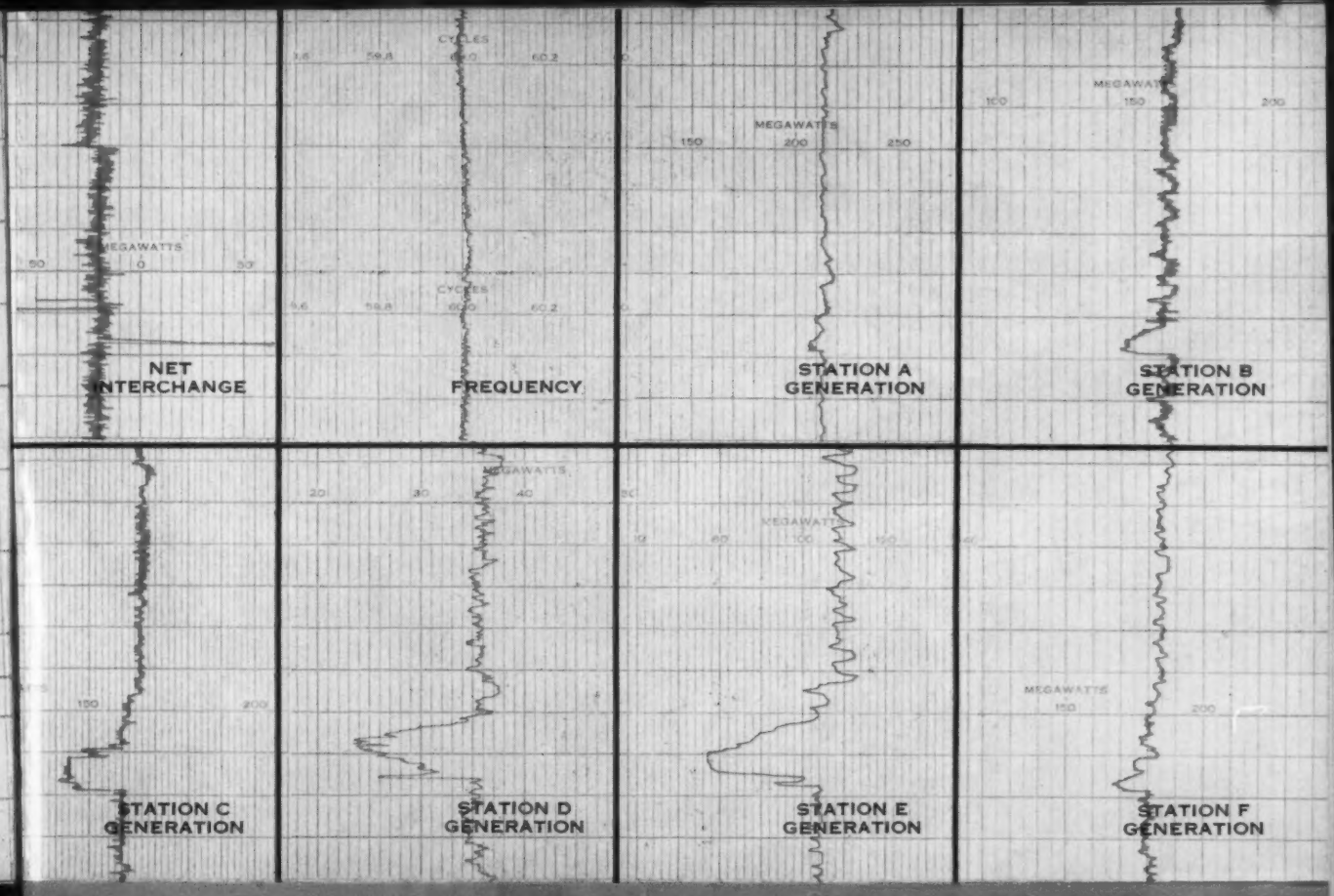


"In my estimation, this incident was as severe a test as we could ever experience"



"In my estimation, this incident was as severe a test as we could ever experience" . . . so said the owner of these charts who operates a large system (capacity in excess of 2,000 MW) using a custom arrangement of Leeds & Northrup economic loading controls.

The incident to which he referred involved an instantaneous loss of 110 MW load. The events which followed — as illustrated graphically above — show that when you install custom L&N controls, you get *results*.

HERE'S HOW IT HAPPENED AS INDICATED BY THE OFFICIAL DISTURBANCE REPORT:

12:14 PM With 13 steam, and two hydro units under economic loading control, an automatic breaker operation tripped 110 MW load. Tie control immediately jumped from 25 MW "In" to 73 MW "Out." All units under control dropped generation automatically. Two additional hydro units not under control were dropped 50 MW by alert Dispatchers who correctly inferred the cause of the disturbance from recorded data in the System Control Center.

12:15 PM Tie control on schedule.

12:21 PM Permission was requested to cut in 55 MW of the "lost" load. Permission granted.

12:22 PM System hit with 55 MW instantaneous load increase.

12:22:30 PM Tie control on schedule.

12:24 PM Permission granted to cut in remaining 45 MW load.

12:24:30 PM Tie control on schedule.

A most critical moment occurred at 12:15 P.M. (arrow on Area Reqt. chart) when the control brought generation into the control point at the maximum regulating rate. Under the circumstances which led to the disturbance, any hesitation by the control would have contributed to a potentially damaging system breakup. But, as one observer commented, "This control slammed into the control point at top speed and corrected the system error as if the laws of inertia had been repealed." There was no overshoot, no hunting, at any time.

When you specify L&N controls, you assure *results* because you can "custom arrange" the control components that gear your dispatching operations to the *realities* of your system's operating needs. For a complete report on the above incident, dial the number of your nearby L&N Field Office, or contact 4938 Stenton Avenue, Philadelphia 44, Pa.

CUSTOM CUSTOM

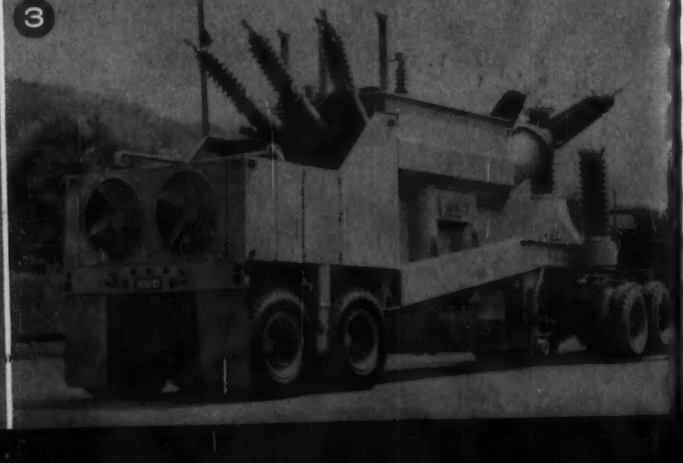
you get custom results with L&N custom generation controls

LEEDS & NORTHRUP CO.

New York State Electric and Gas Corp. reports....

1

2



3

MOBILE SUBSTATIONS

"AN ESSENTIAL TOOL" IN OPERATION OF ELECTRIC DISTRIBUTION SYSTEMS

Advantages include:

IMPROVED SERVICE TO CUSTOMERS
LOWER MAINTENANCE COSTS
SAFER WORKING CONDITIONS

An official of the New York State Electric and Gas Corporation makes the following report on his company's use of mobile substations:

"The New York State Electric and Gas Corporation has found that mobile substations are an essential tool in the operation of electric distribution systems. Modern factory-assembled mobile substations such as the 5000-kva Pennsylvania Transformer 'Transmobile' substation (shown here in service) are used to insure the least possible inconvenience to customers when service continuity is threatened by reason of the following:

1. testing and maintenance of substation transformers;

2. replacement of transformer banks to provide increased capacity or higher voltage operation;

3. alterations and/or additions to substation structures for purposes of rehabilitation or enlargement of facilities.

"In addition, there is, of course, the obvious usefulness of mobile substations for restoring service following failure of a permanent substation, and for serving temporary loads or new loads prior to the completion of permanent facilities.

"Experience has shown that the use of mobile substations for planned maintenance of equipment and alterations to substation structures gives direct benefits of lower labor costs and safe working conditions. By transferring the load to a mobile unit when work is scheduled on a permanent substation, this work can proceed during regular hours and under safe working conditions. In turn, the resulting improved working conditions will enable the crew to operate more efficiently. If a mobile substation is used where the construction of temporary facilities would otherwise have been necessary, the man-hours of labor which would have gone into the installation and removal of such temporary facilities can be used more productively."

To provide all the advantages outlined in this report by New York State Electric and Gas Corporation, a mobile substation must combine maximum substation versatility with maximum mobility and installation ease. Pennsylvania Transformer—as shown by the representative units pictured on these pages—has the experience needed to meet individual substation requirements while custom-designing to satisfy highway weight and clearance limitations.

Pennsylvania's experienced engineers will gladly work with you in determining the most efficient mobile substations for your system. Contact Pennsylvania Transformer Division, McGraw-Edison Company, P. O. Box 330, Canonsburg, Pennsylvania.

McGRAW EDISON

PENNSYLVANIA POWER TRANSFORMERS

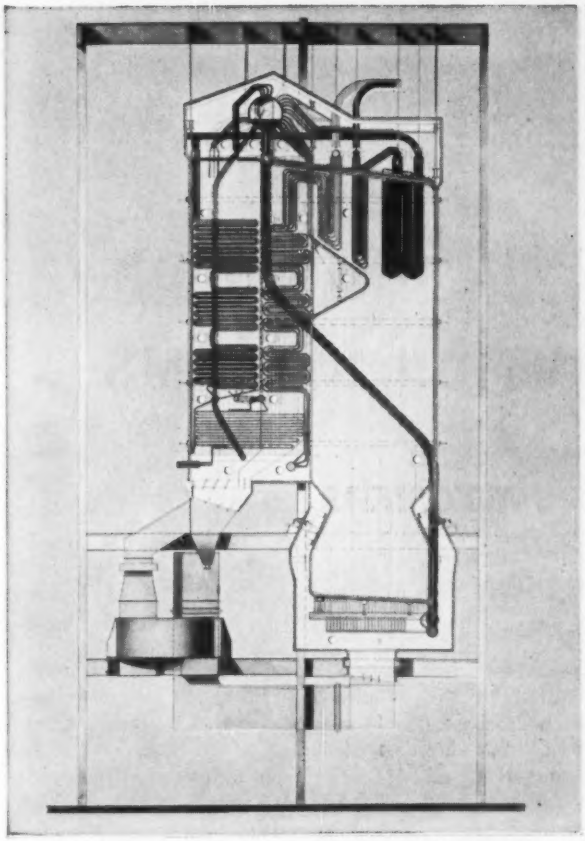
PENNSYLVANIA TRANSFORMER

1. At Elmira, N. Y., a Pennsylvania Transmobile Substation replaces a 5000-kva bank during installation of a new 10,000-kva unit. New York State Electric and Gas Corporation reports that mobile substations reduce costs of maintenance and alterations.

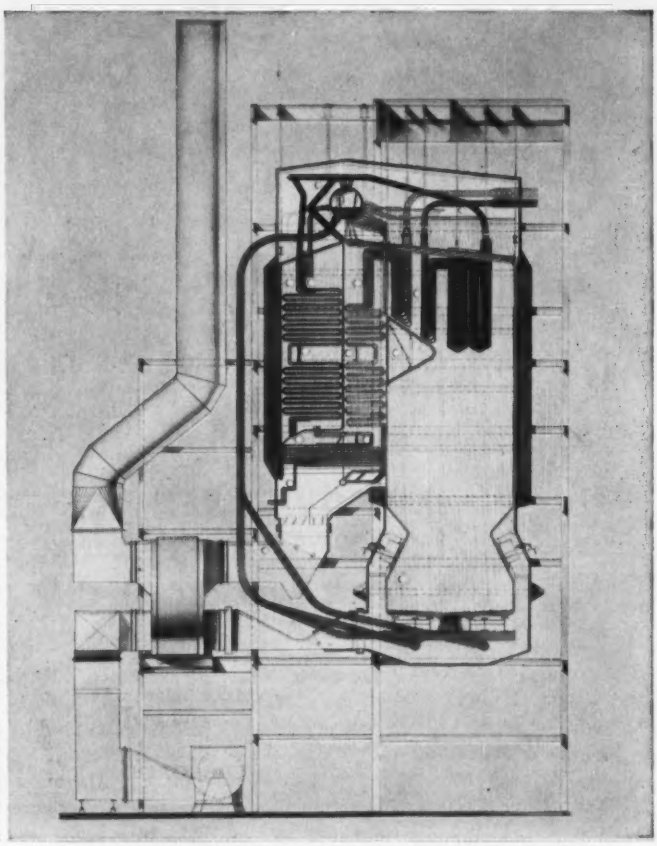
2. The same 5000-kva unit, "ready to roll."
High voltage: 34400Δ volts.
Low voltage: 2520/4360Y/2520x5040/8320Y/5040x7560/13090Y/7560 volts.
Tertiary voltage: 12600 volts.

3. 15000-kva mobile autotransformer (138-69 kv) now serving a Southwestern utility. Innovations include rotatable bushings to reduce set-up time.

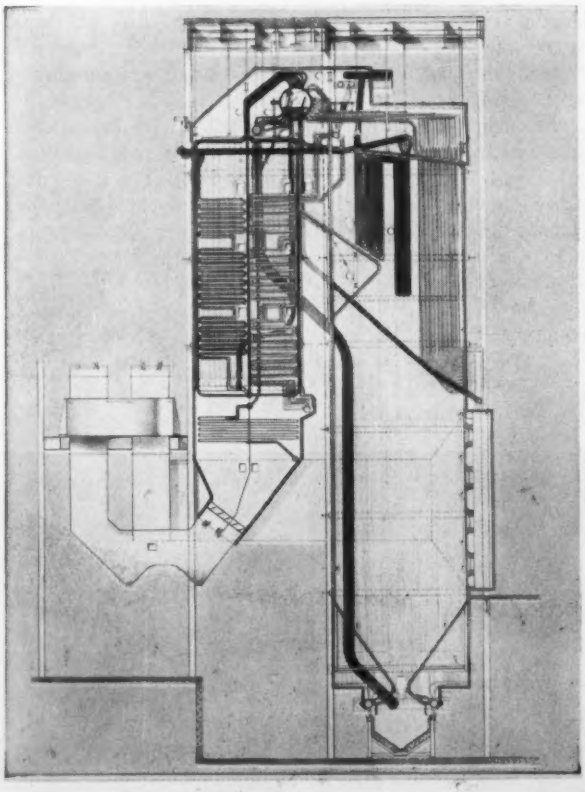
4. 3750-kva Pennsylvania Transmobile Substation custom-designed for an Eastern utility.
High voltage: 25700x51400Δ volts.
Low voltage: 2520/4360Y/2520x5040/8720Y/5040x7560/13090Y/7560 volts.

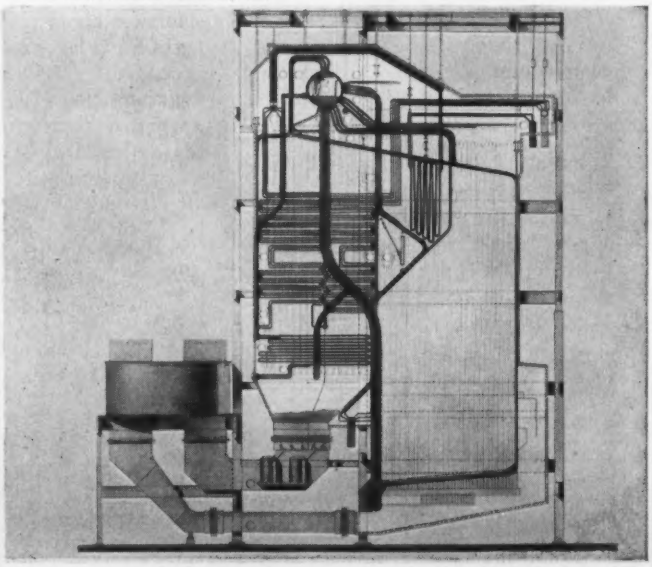


TURBO FURNACE Reheat Unit for **Florida Power Corporation** has capacity of 600,000 lbs/hr. 1750 Psi, 1000/1000 F. Fuels: oil, gas. Could convert to coal with minimum outage. **Black & Veatch.**



This Riley **TURBO FURNACE** Reheat Steam Generator for **Dallas Power & Light Company** is pressurized, has a steam capacity of 1,200,000 lbs/hr. 1005/1005 F. 2125 Psi. Will burn gas and oil initially and convert readily to lignite, coal in future. **Ebasco Services, Inc.**





This 350,000 lbs/hr. Gas Fired Reheat Unit is operating at **Central Louisiana Electric Company's** Teche Power Station. A duplicate is being installed at Coughlin Station. 1650 Psi, 1005/1005 F. Fired by Riley Intertube Burners. **Sargent & Lundy.**

This 690,000 lb/hr. Reheat Unit is now on the line at R. S. Wallace Station of **Central Illinois Light Company** 1650 Psig 1000/1000 F. Fuel: Central Illinois coal. **Commonwealth Associates, Inc.**

NOW Is The Time To Order New Steam Generating Capacity

A new era of growth in the field of power generation is approaching . . . an era that promises to greatly increase the demand on manufacturers of steam and electrical generating equipment. Riley Stoker Corporation, having successfully met the challenge imposed by the remarkable growth of the past decade is now thoroughly prepared to meet the even greater challenge of the new era. Riley is fully staffed and manned in both engineering and manufacturing divisions. Orders placed NOW will be processed efficiently and quickly. Avoid the competition for delivery that may result if the inevitable order is delayed to a time when late delivery may result.

For a more comprehensive discussion of this serious message we refer you to The Management News Letter in the February 2, 1959 issue of Electrical World. We will gladly furnish you with a reprint.

TURBO FURNACE BOILERS THOROUGHLY FIELD TESTED

With the Riley Turbo Furnace thoroughly field tested you can specify the Riley Turbo Furnace Boiler with full confidence that it will live up to its superior performance characteristics. Turbo Furnace Boiler Designs are supplied with Reheat and Non-Reheat and with pressurized and non-pressurized furnaces.

RILEY BOILERS GIVE SUPERIOR PERFORMANCE WHEN EQUIPPED WITH COMPLETE RILEY FUEL BURNING SYSTEMS

Any fuel or any combination of fuels can be burned efficiently with Riley Boilers because Riley also manufactures a complete line of fuel burning products. For pulverizing coal Riley offers two types of mills: the Riley Pulverizer and the Riley Ball Tube Mill. These are used with either Riley Flare Type Gas/Oil/Coal Burners with Riley wall fired units, or with Riley multiple fuel Directional Flame Burners with the Turbo Furnaces. Riley also furnishes spreader stokers, traveling grate stokers and underfeed stokers. A Riley Boiler installation complete with Riley fuel burning equipment assures a contract of undivided responsibility.

RILEY PROVIDES FULLY EQUIPPED AND SKILLED CONSTRUCTION SERVICES

Riley Stoker Corporation supplies complete construction services with its equipment. Riley construction crews employ the latest in construction methods and techniques.

EXPERIENCED SERVICE ENGINEERS ASSURE SAFE, DEPENDABLE AND EFFICIENT OPERATION OF RILEY BOILERS

Riley Service Engineers are trained to provide prompt and efficient servicing of all Riley installations. These experienced engineers work closely with your operators to assure that your Riley equipment will operate at high efficiency for long uninterrupted periods of operation.

YOU'LL FIND A RILEY REPRESENTATIVE IN EACH OF THESE PRINCIPLE CITIES:

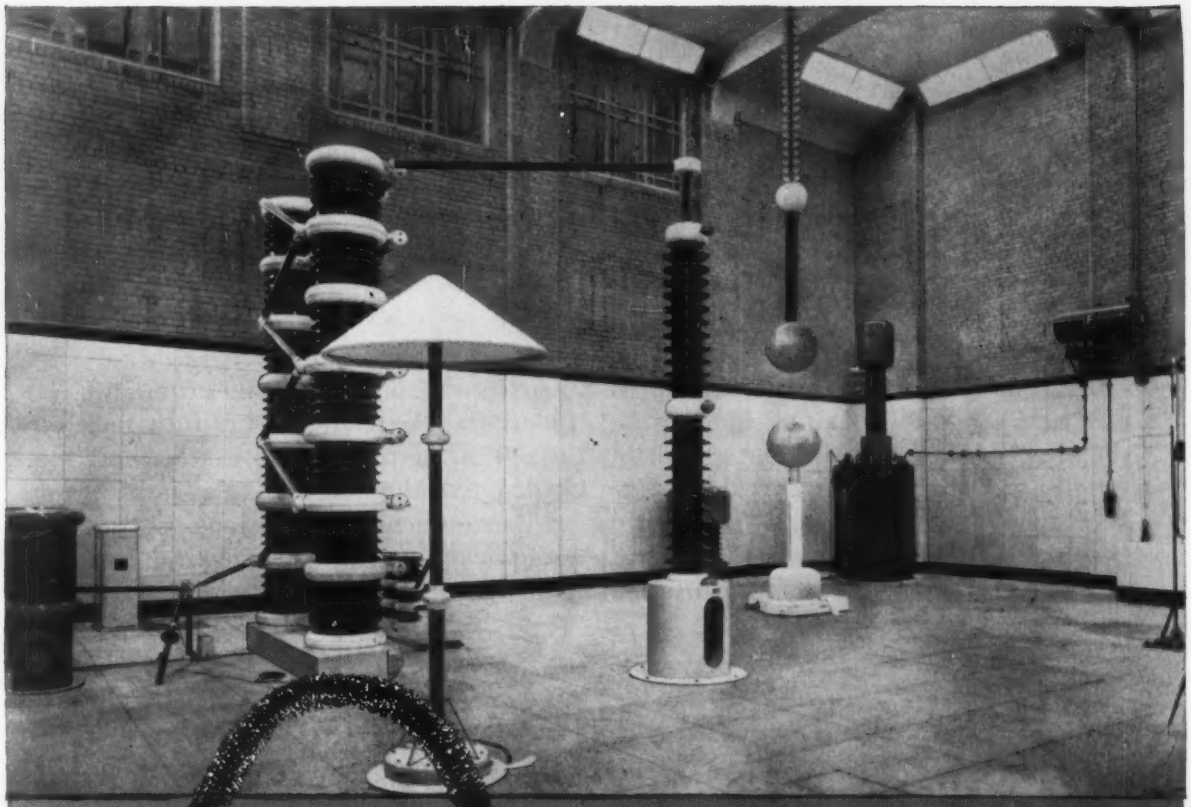
Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, Seattle, St. Louis, St. Paul, Syracuse, Worcester.

RILEY STOKER CORPORATION, WORCESTER, MASSACHUSETTS

A survey of your plant by a qualified consulting engineer could show ways of making surprising savings in your power costs.

RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT



Ferranti High Voltage Testing Equipment installed at the Manchester College of Science and Technology

All the testing equipment illustrated has been supplied by Ferranti Ltd. and is installed at the Manchester College of Science and Technology, Manchester, England. It consists of:

330,000 volt, 100 kVA single phase 50 cycle Testing Transformer and Control Equipment.

750 mm Sphere Gap.

1,400,000 volt, 2 column Impulse Generator complete with Control Equipment and Cathode Ray Oscillograph.

FERRANTI ARE SPECIALISTS in the manufacture of AC and DC Equipments for all kinds of routine and research testing, and are backed by 75 years' experience in the manufacture and development of electrical apparatus.

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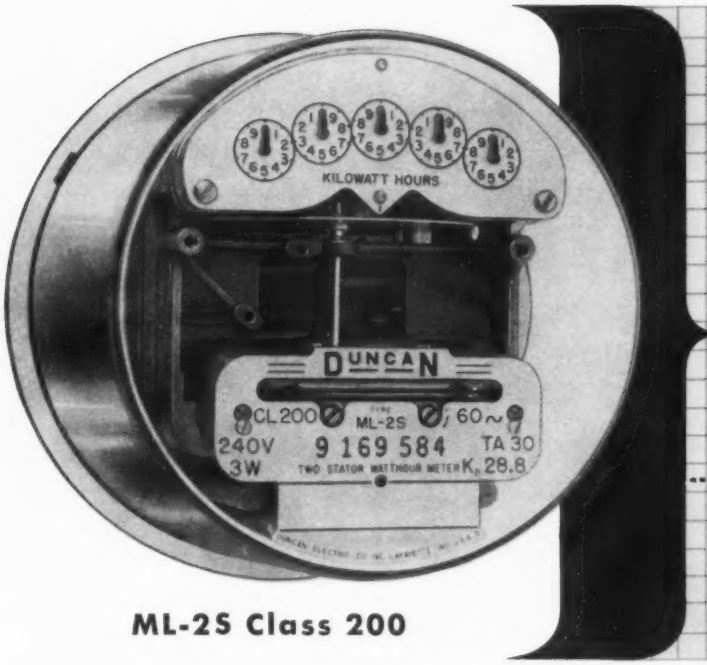
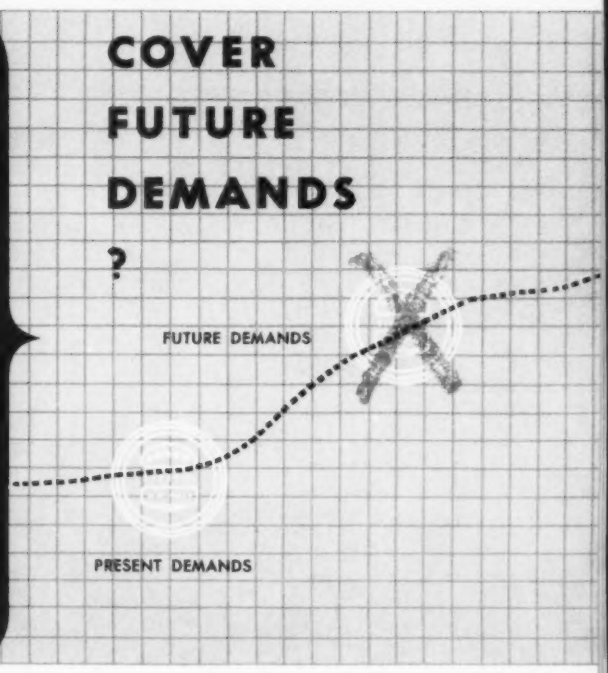
why pay twice

TO COVER FUTURE DEMANDS ?



ML-2S Class 200

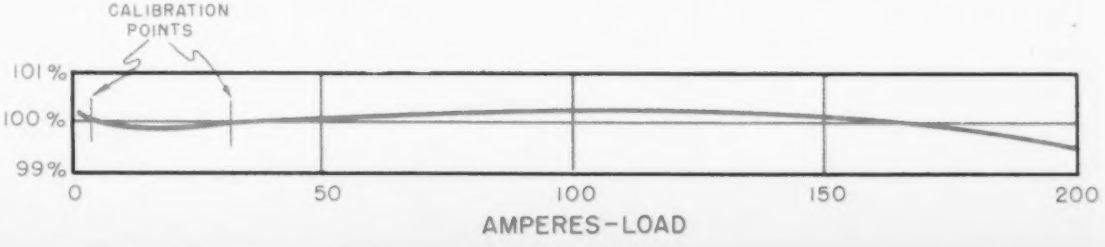


DUNCAN 200 AMP extended range polyphase meter

- **Accurately meters loads up to 200 amperes**
- **Reduces cost of replacement to meet increased demand**
- **Gives you more metering capacity per dollar**

DUNCAN Extended Range Meters can substantially reduce your metering costs. For example, the DUNCAN ML Class 200 Socket Type Polyphase meters accurately measure loads from a few watts to the meter's full 200 ampere capacity. Thus, it stays on the job long after increased demand has made it necessary to replace meters of lower capacity. You save both on installation time and on the cost of new meters . . . you get more metering capacity and longer metering service per dollar spent.

When you install DUNCAN meters you are assured of the finest performance that over 50 years of specialized meter experience can provide. One significant example is the long range load curve shown below.

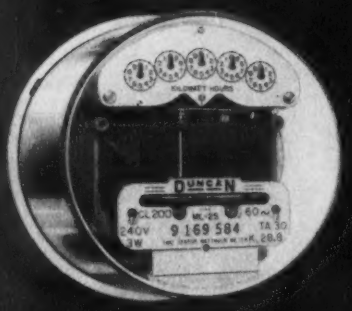


"Thinking Ahead . . . Moving Ahead . . . to stay Ahead of Demand!"

DUNCAN "COMPANIONS"

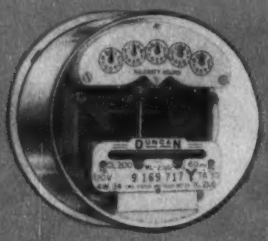
save space • save time • save money

EXTENDED RANGE POLYPHASE METERS



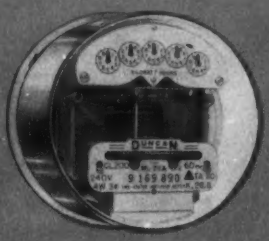
DUNCAN
ML-2S Class 200
3-Phase 3-Wire

ML - 2½S

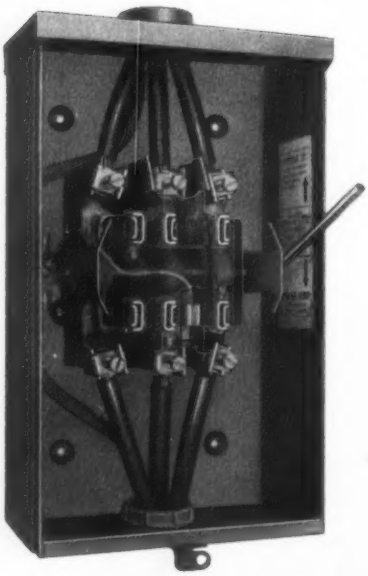


3-Phase 4-Wire Wye

ML - 2S△



3-Phase 4-Wire Delta



DUNCAN HQ | High Capacity-Quick Operating MOUNTING DEVICE

. . . featuring simultaneous by-passing and releasing of meter clamps

DUNCAN Type HQ mounting device (singlephase or polyphase) is conservatively rated for high load factor loads up to 200 amperes using self-contained socket type meters having a maximum capacity equal to the load to be served. DUNCAN HQ has many important construction and "use" features which add substantially to convenience and economy of installation.

TYPE HQ-7

Used with 7-terminal meter on 3-phase 4-wire wye or delta services

TYPE HQ-5

Also Available May be used on 1, 2 or 3-phase 3-wire services

Write direct to Duncan Electric for descriptive data and bulletins on Duncan Extended Range Polyphase Meters and High Capacity Mounting Devices.

DUNCAN ELECTRIC COMPANY, INC., Lafayette, Indiana

"THINKING AHEAD . . . MOVING AHEAD . . . TO STAY AHEAD OF DEMAND"

LIVE BETTER ELECTRICALLY WITH FULL HOUSEPOWER

The Electrical Week

LATE NEWS ▶

Washington Wire . . . Three Kansas co-ops get $7,293,000 in REA loans to (1) Integrate their systems, (2) Add 12,000 kw of generation, and (3) Connect with another co-op and two power companies . . . Former Sen Arthur Watkins (R-Utah) becomes consultant to Interior Secy Seaton on water and power matters . . . Interior Dept is again trying to get wheeling rights over Idaho Power's transmission lines . . . FPC issues water-level regulations for New York State Power Authority's St. Lawrence River hydro project.

Nuclear Notes . . . AEC to build 25,000-ekw gas-cooled reactor at Oak Ridge; TVA pressing to operate it. Sen Anderson, Joint Committee on A-power chairman, pleased by Oak Ridge decision, won't try to block Philadelphia Electric's gas-cooled project . . . AEC tentatively selects GE to do R&D work on plutonium-oxide-uranium fast breeder reactor . . . European utilities have until Sept. 1 to submit A-plant proposals under U.S.-Euratom agreement.

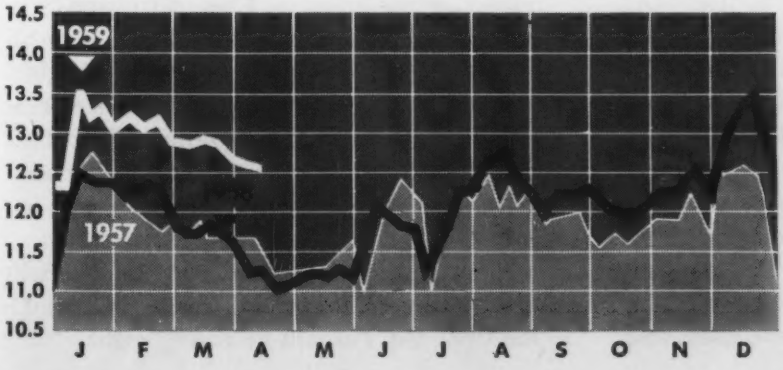
Navy awards Westinghouse contract for 5-kw thermoelectric generator to be used with existing naval equipment or as mobile power source.

Federal Power Board, Rhodesia, Africa commissions 330-kv line running from Norton to Salisbury, a distance of 21 miles. It is first such line in Africa, and highest in Southern Hemisphere.

Management changes . . . B. L. England elected board chairman and C. M. Hagen president at Atlantic City Electric Co . . . H. W. Atkinson becomes vp at Cambridge Electric Light Co . . . A. B. Robinson is new vp at British Columbia Electric Co.

Obituaries . . . H. F. Saunders, 53, vp and treasurer, Middle South Utilities, died on Long Island April 14 . . . A. N. Cartwright, 77, retired vp and director of West Penn Power Co, died April 11.

WEEKLY POWER OUTPUT—UP 11.5% (Week ending April 11), Kwhr 12,604,000,000



Per Cent Change From Previous Year

	Mar. 28	April 4	April 11
Total U. S.	+ 9.1	+11.4	+11.5
New Eng.	+ 7.0	+10.3	+ 7.8
Mid. Atlantic	+ 7.2	+ 9.7	+ 9.9
Cent. Ind.	+12.2	+16.1	+14.2
West Cent.	+ 9.7	+ 9.7	+10.8
Southeast	+ 2.0	+ 5.9	+ 4.9
South Cent.	+13.4	+14.0	+16.2
Rocky Mount.	+15.4	+14.5	+14.3
Pacific			
NW	+ 9.8	+ 8.0	+ 9.5
SW	+17.9	+16.8	+23.2

Seasonally Adjusted Index 250.6

Week Ago 249.8 Year Ago 224.1

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Capital spending by all businesses will rise 7% in 1959,** according to McGraw-Hill's 12th annual survey. A 65% increase in modernization outlays and a 12% gain for research spending are highlights of the advance. Utilities will spend $6.2 billion during the year—only a few million under their 1957 peak **(p 76)** . . . Electric vehicles promise not only a broader market for their products, but improvements over internal combustion-engine cars, say battery manufacturers **(p 78)** . . . EEI, through special attorney A. J. G. Priest, files brief opposing SEC accounting proposal **(p 79).**

ENGINEERING ▶ **Carolina P&L finds 23-kv distribution attractive.** CP&L's E.M. Geddie recaps experience showing improved economy, continuity, regulation, and fewer tree problems **(p 106)** . . . Wisconsin Electric Power raises station efficiency by using full-size turbine-driven and half-size motor-driven boiler feed pump to increase heat rate **(p 175)** . . . New modular air-blast breakers, using building-block design, said to offer savings to users as well as cut manufacturing costs **(p 104).**

EEI 27TH ANNUAL MEETING REPORT ▶ **EEI 27th Annual Convention examines Soviet economic threat** and the obligations it places upon American electric utility industry. Speakers also tackle problems of government encroachments, infla-

Politics and Public Power

BEHIND A 'VICTORY', DISSATISFACTION

The National Rural Electric Cooperative Assn won an important propaganda victory recently in the Senate, but it was marred by what some observers consider a few more shreds of evidence of growing dissatisfaction in the Clyde T. Ellis' camp.

The victory is the Senate's passage of Sen Hubert Humphrey's bill (S-144) to "free" the Rural Electrification Administration from any loan-review powers of the Secretary of Agriculture by a 60-to-27 vote. This lopsided vote shows sufficient strength to override an expected veto by President Eisenhower. Furthermore, eight more senators, out of 11 not voting, indicated they would have voted for the bill, had they been present. An identical bill, (HR-1321), introduced by Rep Melvin Price (D-Ill.), also received a favorable vote on the floor of the House of Representatives (254 to 131) on April 15.

Now there is no doubt that NRECA has worked hard to get Humphrey's bill through. When it was first introduced in 1958, Ellis, in supporting it, claimed it was necessary to cancel a 1953 Agriculture Department reorganization plan, which gave the Secretary added authority over the various agencies—including REA—within his department. This authority, according to Ellis, permitted Benson to issue a "secret order" in 1957 that all REA loan applications in excess of $500,000 would have to be reviewed by his office prior to approval by the REA Administrator. This said Mr. Ellis, was part of the "Wall Street master plan" to "downgrade REA."

There can also be little doubt that Ellis will claim the credit for getting these bills through the Congress. Perhaps he will be right.

tion, taxes, rates, regulations, sales, and—women. The details of this 16-page cover story begin on **page 83.**

MANAGEMENT ▶ **What's the job of the utility purchasing agent?** He helps spend millions of dollars annually, maintains liason with manfacturers, and acts as a catalyst for management on matters involving the utility's pocketbook. For a look at the role he plays, see **page 189.**

MANUFACTURERS ▶ **Manufacturers "loan" equipment for experimental EHV line,** or they send it to the utility "on consignment." This way they help to cut R&D costs, and to release utility funds for heavier equipment. Pennsylvania Electric's 13-mile, 460-kv line is a case in point . . . I-T-E Circuit Breaker builds 2,500-kw silicon rectifier **(p 100).**

NEW EQUIPMENT ▶ **Compression connector for service entrances is pre-insulated** for speedier installation . . . Disconnect switch is available in 5 to 69 kv, in 400, 600 and 1,200-amp ratings . . . Capacitor racks for 100-kvar units facilitate installation of pole-mounted capacitor banks **(p 120).**

SELLING ▶ **Two Kansas utilities offer answer to gas light fad.** Kansas G&E pushes "Friendship Lanterns," Kansas P&L its "Twiliter" **(p 130).**

Sen Frank Lausche (D-Ohio), however had a different explanation for introduction of the Ellis-supported Humphrey bill:

"First, dissatisfaction with the farm policy of Mr. Benson.

"Second, dissatisfaction with the position the Administration took on the Hells Canyon project.

"Third, dissatisfaction with the proposal of the Administration that the government collect on its (REA) loans interest equal to that which it has to pay on what it borrows."

Lausche added, "In substance, this bill contemplates reorganizing the government to suit the whims or caprices of some who are not satisfied with what is being done by a particular person in the Administration."

On another point—the actual effectiveness of the bill—Sens George Aiken (R-Vt.) and Carl Curtis (R-Neb.), both agreed that S-144 is "meaningless."

Aiken pointed out, "I know it is said that the Secretary (Benson) is going to do some harm to REA. However, the fact remains that he has not done such a thing. The fact also remains that even if S-144 were enacted, and he were minded to do harm to the REA, he would still have the authority to do so."

Curtis emphasized, "Even though the REA Administrator had the power of final approval of the making of a loan to a local REA (co-op), the Secretary (under Section 3 of the REA Act) could withhold a request to the Secretary of the Treasury for the amount of the loan or a part of the amount." He said the Humphrey bill was "condensed confusion."

These criticisms come from men who cannot be called unfriendly to REA, but who may be growing increasingly tired of having their actions linked demagogically with every "victory" the federal power advocates claim.

Most comprehensive engineering directory of the United States, the 1959 Engineering Societies Directory represents the first revision of this publication since 1956. It provides basic information concerning international, national, regional, state and local engineering groups. The directory includes addresses, memberships, secretaries, and organizational publications. Price-$3.50. **Engineers Joint Council, 29 W. 39th St. New York 18, N. Y.**

Future research projects of the industry will benefit from a cooperative program that provides for (1) greater emphasis on research activities of standing committees; (2) greater and systematic coverage of needed research; (3) promotion of cooperation; and (4) a central informational service. **Howard P. Seelye, EEI Bulletin, March 1959.**

Utility customers are not happy about appliance servicing. This growing problem will react against the entire electrical industry unless action is taken. These steps will be helpful: Products should be designed for easy servicing and with a minimum of different working parts; service people should be better trained and the customer better informed about the use of the appliance. **William H. Wagner, Wisconsin Electric Power Co, EEI Sales Conference, Chicago, March 1959.**

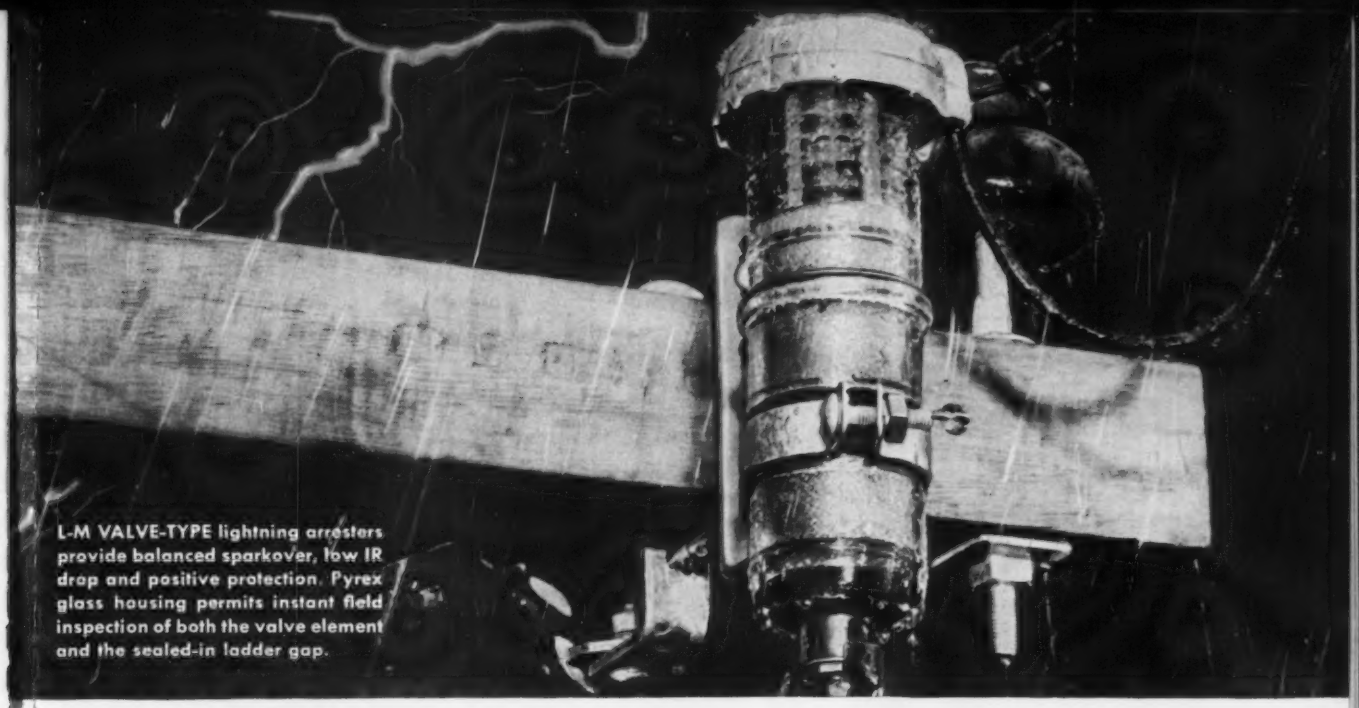
TECHNICAL NOTES

Ferro-resonance is likely in series capacitor-distribution transformer combinations if more than 1.5% capacitor compensation is used. The capacitor must be protected by a shunt resistor or gap to prevent failure. **E. F. Kratz, L. W. Manning, and Miles Maxwell, Westinghouse Electric Corp, AIEE TP 59-53.**

Technique of making rods of metallic uranium at the Springfields, Lancashire plant for the Calder Hall, Chapelcross and Harwell nuclear stations has been declassified by the UK's Atomic Energy Authority. Details of producing the rods are presented. **J. Foster Petree, European Correspondent, Mechanical Engineering, March, 1959.**

FROM EDITORS IN THE FIELD

Tubular aluminum braces for H-frame design promise about a 25% reduction in weight of metal components for about equal cost. **California Electric Power Co, San Bernardino, California.**



L-M VALVE-TYPE lightning arresters provide balanced sparkover, low IR drop and positive protection. Pyrex glass housing permits instant field inspection of both the valve element and the sealed-in ladder gap.

Now It's 12 Years . . .

And This Utility's Performance Record On L-M Valve Arresters Is Even Better!

For 12 years now, a large midwestern utility company has kept accurate performance records on L-M valve-type arresters. And even though, year after year, the number of arresters increases, Isolator operations remain fairly constant.

At the end of 1956, latest year for which records are available, the company had in service 29,300 L-M valve arresters, representing a total of 167,410 arrester service years.

During this entire period there were 59 Isolator operations, disconnecting a faulted arrester from the line. Out of 2349 L-M arresters removed from service because of system changes, and then tested, not a single arrester failed in the tests.

Glass Housing Permits Visual Inspection

Outstanding features of L-M arresters helped make this remarkable record possible. With L-M's exclusive Pyrex glass housing, arresters can be visually inspected right on the pole. Any potential failure is instantly apparent. This eliminates unexplained fuse blowings because of an arrester that has failed or is about to fail on the next surge. This inspection is, of course, not possible with a porcelain-housed arrester that could be put on the line and fail at the next surge.

Isolator Added Insurance Feature

The Isolator, an L-M patented insurance feature, instantly disconnects the arrester from the ground in case of failure. Thus L-M valve arresters will not lock-out feeders, even in the rare cases of failure. In the case of this utility, the 59 Isolator operations prevented 59 cases of feeder lock-out.

Get This Free Bulletin

Ask the L-M Field Engineer for Bulletin LA-2, which gives details on L-M valve arrester design and characteristics. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

Here are the records for the years 1945 through 1956

Year	Arresters In Service	Isolator Operations In Service	Arresters Tested	Arresters Failed In Test
1945	3,286	5	0	0
1946	4,322	2	11	0
1947	6,020	2	137	0
1948	7,469	4	118	0
1949	8,686	3	186	0
1950	11,392	7	161	0
1951	13,950	3	270	0
1952	15,282	7	204	0
1953	20,498	13	158	0
1954	21,105	2	383	0
1955	26,100	3	245	0
1956	29,300	8	476	0
1957	*Records not yet available*			
Total Arrester Service Years: 167,410		59	2,349	0

59 ÷ 167,410 x 100 = .0352% failure rate

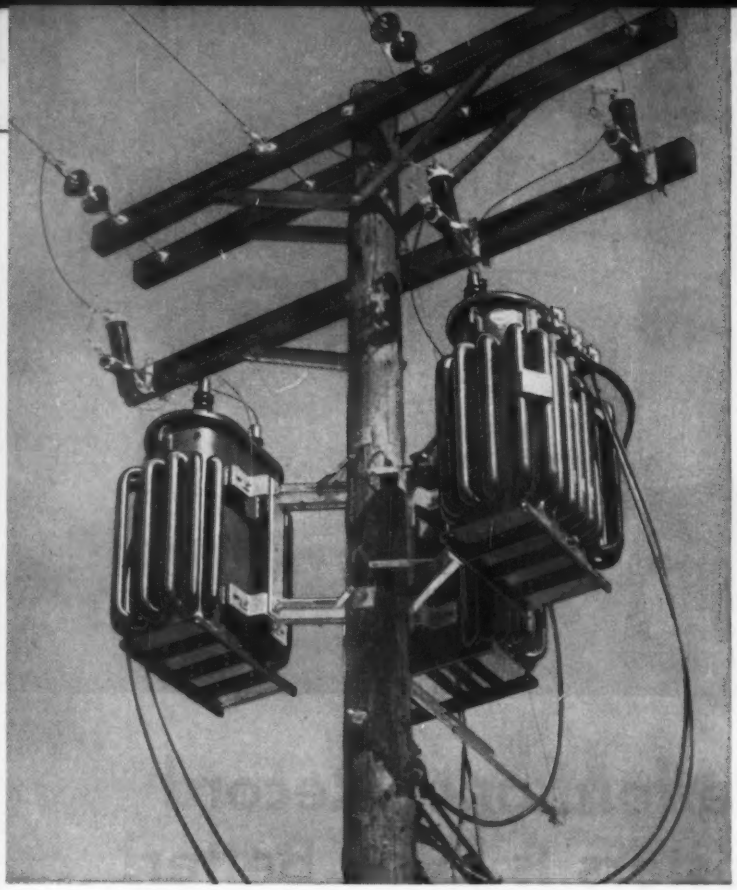
360

McGRAW EDISON

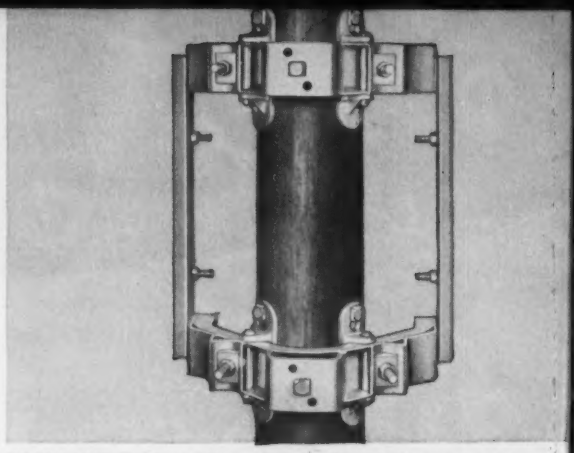
LINE MATERIAL Industries Lightning Arresters

McGRAW-EDISON COMPANY

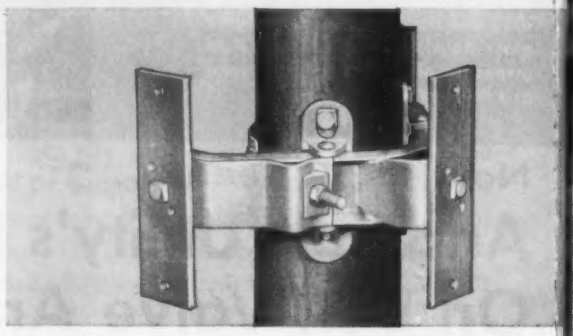
DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



Three L-M obround transformers, on L-M cluster mounting bracket. Note the ample climbing space that assures easy, safe access for the lineman.



POLE-BAND TYPE—L-M's newest design in cluster mounting brackets. Eliminates thru-bolts; extremely sturdy; transformers hug the pole closely; available for combinations up to three 167 kva's.



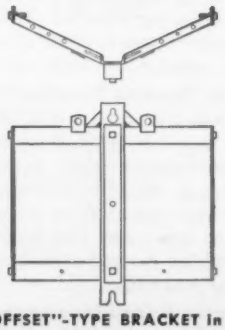
Two or three smaller transformers can be mounted solidly on this simple version of L-M Pole-Band cluster mounting.

L-M Cluster Mounting Brackets Facilitate Three-Phase Banking

Cluster mounting of two or three transformers offers a substantial saving over cross-arm mounting, and most certainly over platform construction. L-M offers a variety of cluster mountings for two or three transformers from 3 to 167 kva. These mountings are well designed to afford maximum climbing space, with sturdy support and adequate clearance for primary connections.

These cluster mountings are representative of a very large variety of custom-designed and regular hardware for construction of primary and secondary distribution and transmission lines. If you aren't familiar with some of the items L-M has designed specially to meet custom requirements, ask the L-M Field Engineer to match your needs with L-M equipment. Or write for "New Product Bulletins" giving complete details. Line Material Industries, Milwaukee 1, Wisconsin. In Canada, Canadian Line Materials, Ltd., Toronto 13, Ontario.

DUAL MOUNTING BRACKET, for two transformers from 3 to 50 kva. A very strong, simple unit that is mounted with two machine bolts. Like all other L-M brackets, it meets EEI-NEMA standards for electrical and physical clearances. Transformers can be mounted on bracket and bracket hoisted into position with lifting eye, which exceeds 11,000-pound lift test.



"OFFSET"-TYPE BRACKET in three sizes, for transformers up to 25 kva, up to 50 kva, and up to 167 kva each. Assembled on location. Keyhole-shaped upper mounting slot facilitates installation. Provides approximately 120 degrees climbing space. EEI-NEMA electrical and physical clearances for all transformers, including those with side-wall bushings.

LINE MATERIAL Industries

McGRAW-EDISON COMPANY

McGRAW EDISON

Line Construction Materials

365

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

VIEW OF DAKOTA AVENUE, WAHPETON, N. D., shows the attractive daytime appearance of L-M's shallow-globe fluorescent luminaires. Mounting height is 28 feet, with Union Metal davit-type poles opposite each other at 100-foot intervals. This provides 1.2 footcandles of even, glare-free light. Installation by Hintgen-Karst Electric Company of Wahpeton.

Wahpeton Selects L-M Fluorescents for Complete New Street Lighting System

With cooperation of Otter Tail Power Company, Wahpeton's Street Committee makes thorough study and comparative analysis of various makes of luminaires for lighting business streets and neighborhoods.

More than 130 new L-M fluorescent lights illuminate the business section and side streets of Wahpeton, N. D., with ample soft, glare-free light. The installation, recently completed, replaced a 20-year-old incandescent system.

In a thorough study by the city, the power company made sample installations of a number of makes of luminaires for comparisons of appearance, effectiveness, maintenance and costs. The L-M shallow-type 6-foot units selected are equipped with two 150-watt (25 watts per foot) lamps that provide about 18,600 lumens per luminaire. This results in a maintained level of illumination on the street of 1.2 footcandles on Dakota Avenue, and 0.75 footcandles on side streets.

For complete information on L-M's complete line of outdoor lighting equipment and lighting application engineering, ask the L-M Field Engineer, or phone or write Line Material Industries, Lighting Division, Milwaukee 1, Wis. In Canada, Canadian Line Materials, Ltd., Toronto 13, Ont.

359-R

LINE MATERIAL Industries
McGRAW-EDISON COMPANY

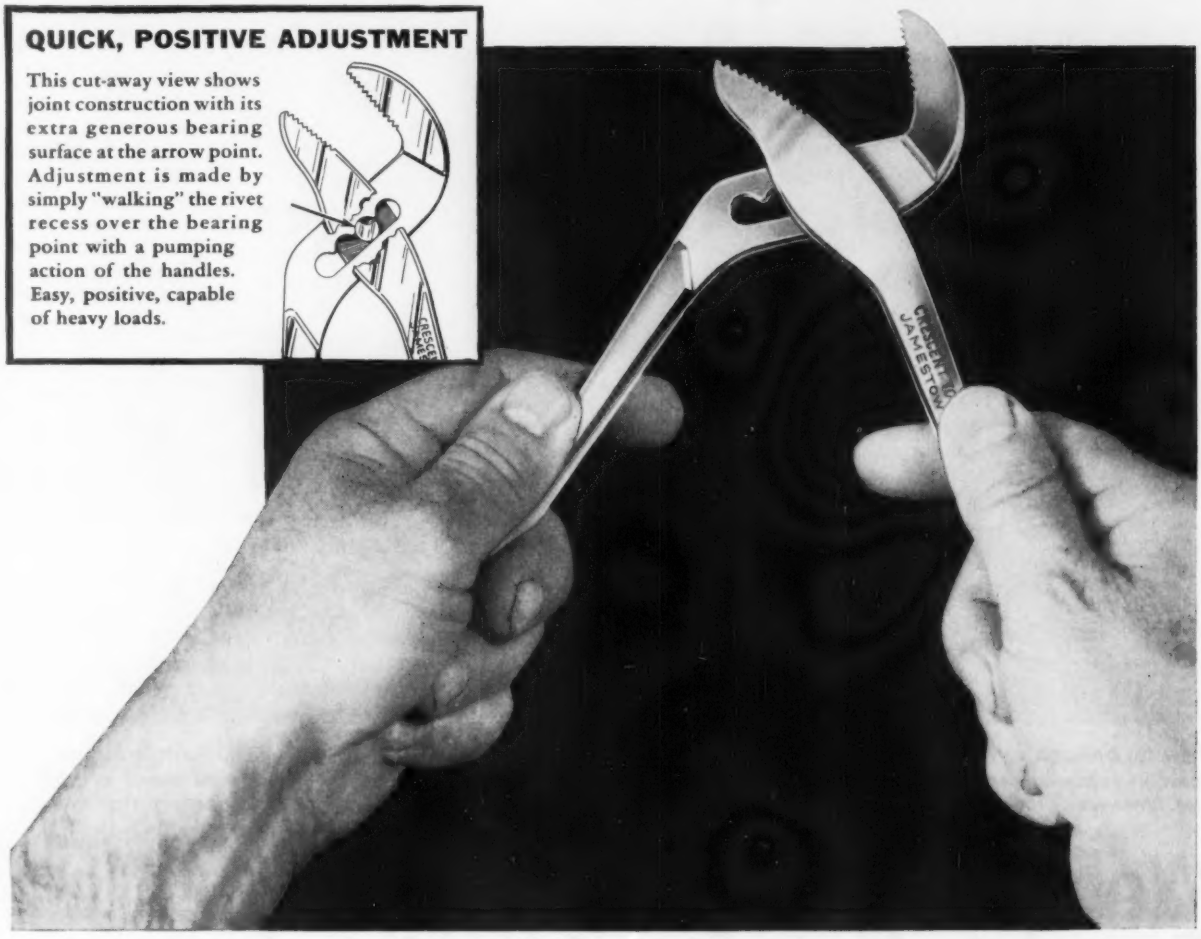
Outdoor Lighting

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

Not only stronger and thinner . . . but
EASIER TO ADJUST

QUICK, POSITIVE ADJUSTMENT

This cut-away view shows joint construction with its extra generous bearing surface at the arrow point. Adjustment is made by simply "walking" the rivet recess over the bearing point with a pumping action of the handles. Easy, positive, capable of heavy loads.



So easy that after a little practice it can be done with one hand. Yet once adjusted to any of its four positions, Crescent's P210 Utility Plier just won't slip under severe loads. Yes, here's a 12 ounce plier that performs like a pipe wrench . . . is *stronger* than any other Utility plier . . . *thinner* than any other Utility Plier . . . and retails for only $3.15.

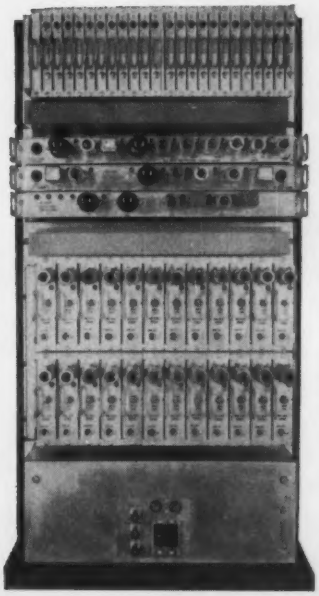
No. P210 will grip flat, square, hex or round objects up to 1½". It measures 9½" overall and is finished in rust-resistant zinc plating.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

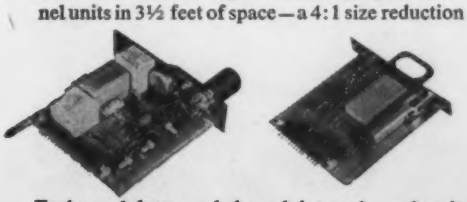
CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Kellogg Sets New Standards of Reliability in Microwave

Backed by the world-wide technical, manufacturing, installation and operating experience of ITT



New MICROPLEX provides 23 plug-in channel units in 3½ feet of space—a 4:1 size reduction



Each modulator and demodulator channel unit features printed circuitry.

Microwave was pioneered by ITT in 1931 with the Channel crossing from Calais to Dover. Today Kellogg Microwave is achieving new levels of reliability: 99.998%, far superior to wire line systems! Operating in dozens of installations throughout the world, Kellogg's *complete* communications package includes:

- *Microwave* — operating in the 2,000 and 10,000 megacycles bands.
- *Terminating Equipment*—for automating functions, including teletype, telemetering, remote control, data transmission.

Part of the Kellogg 10-C Microwave System is the new 10-C-2 "Microplex": a 23 or 45 channel PTM multiplexing equipment. It features printed circuits, miniaturized components, minimum maintenance, and occupies only three-and-one-half feet of rack space. All demodulators are semi-passive—only one tube per channel; modulators are passive—no tubes. The 23 channels use 41 tubes with an input of 180 watts —a 5:1 reduction in power consumption.

MICROPLEX may also be packaged in one seven-foot rack to provide 45 channels; or 23 channels with two-wire termination and tone signaling. Signal cross-talk is 62 db and signal-to-noise (F1A) is 70 db for 23 channels.

Our engineering staff is always at your service—ready to discuss your communications problems. Write for complete details.

Kellogg Switchboard and Supply Company,
6650 S. Cicero Avenue, Chicago 38, Illinois.
Communications Division of International Telephone and Telegraph Corporation.

Regional Offices and Warehouses:

CALIFORNIA
23 Broderick Road
Burlingame, Calif.
OXford 7-5780

GEORGIA
1594 Southland Circle, N.W.
Atlanta 18, Georgia
SYcamore 4-2441

ILLINOIS
4600 So. Tripp Ave.
Chicago 32, Illinois
CLiffside 4-4300

KANSAS
7th & Sunshine Road
Kansas City 15, Kansas
MAyfair 1-4418

MINNESOTA
6100 Excelsior Blvd.
Minneapolis 16, Minn.
West 9-6715

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Syracuse, New York
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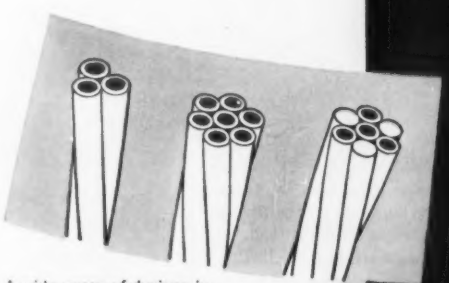
KELLOGG
CHICAGO, ILLINOIS
Communications Division of IT&T

NOW . . . a NEW



A wide range of designs is
both useful and economical

overhead ground wire

ALUMOWELD™

Aluminum-Covered Steel Wire

Exclusive features—

a **thick cladding** of aluminum
a controlled **atomic weld**

Give your transmission lines positive and permanent protection with the new light-weight, low-cost Alumoweld Overhead Ground Wire. It's the only aluminum-covered steel wire with a thick cladding of aluminum and the only one made by the controlled atomic-weld process.

Not only does Alumoweld have the strength of steel wire, but because of its 25% by area aluminum covering, it offers the added advantages of much higher conductivity and far greater service life. In fact, Alumoweld has corrosion resistance equal to solid aluminum wire, has one third the conductance, and eight times the strength. Just about optimum values for an Overhead Ground Wire!

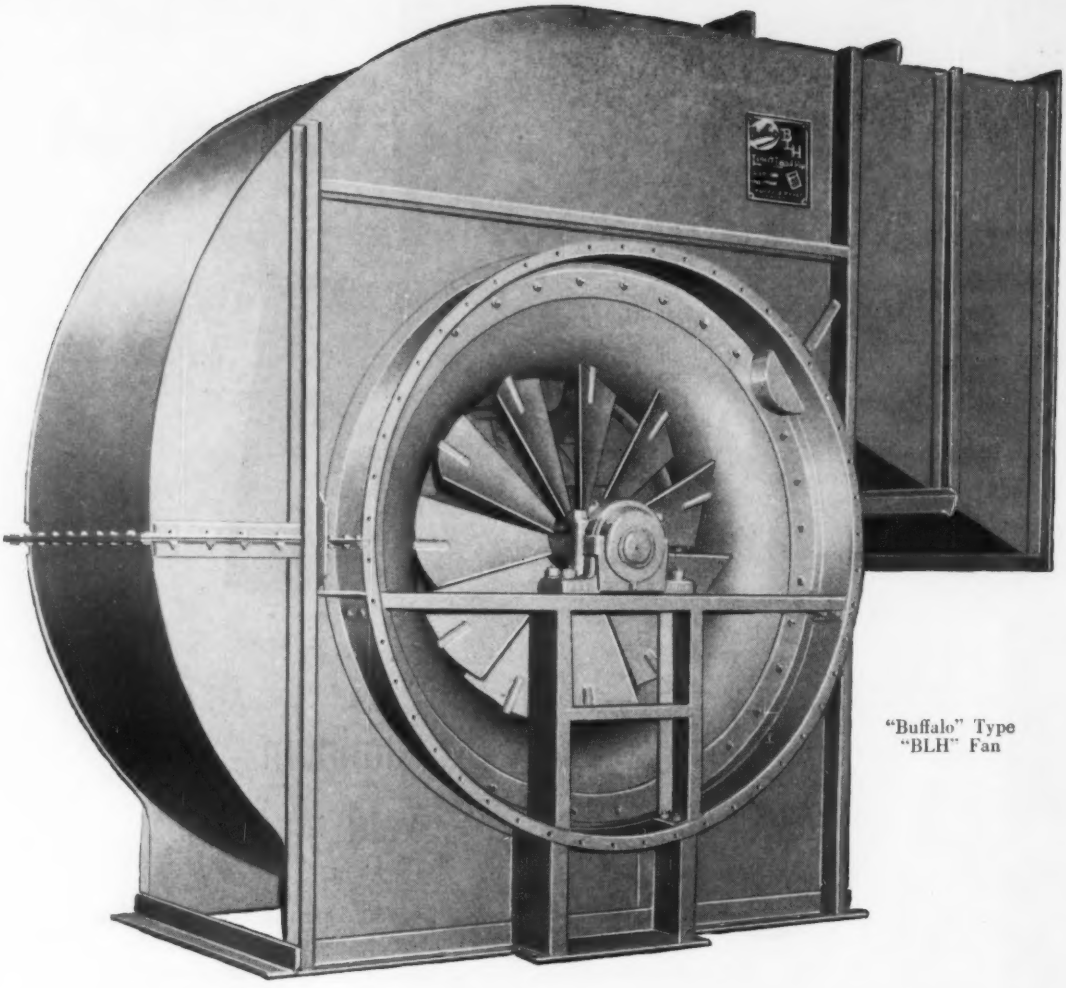
In Alumoweld Overhead Ground Wire, you get three important benefits. (1) Its thick aluminum covering permanently protects the high-strength steel core against corrosion. (2) The electrical conductance is excellent for relaying and for discharging lightning and transient currents to ground. And, (3) Alumoweld's high strength permits stringing for ample mid-span clearance. Together, these add up to long-life protection and reduced service interruptions for your transmission lines.

For more information, write today for Engineering Bulletin E.D.3000.

ALUMOWELD

PRODUCT OF COPPERWELD STEEL COMPANY, WIRE AND CABLE DIVISION, GLASSPORT, PA.

For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York



"Buffalo" Type
"BLH" Fan

HIGH EFFICIENCY OVER BROAD OPERATING RANGE PROBABLY YOUR BEST CHOICE FOR M. D. FANS

Does your mechanical draft installation require a fan that delivers peak-efficiency performance over a broad range? A fan that will give you this with the greatest possible long-range economy?

Then the "Buffalo" Type "BLH" is the fan you're looking for.

The "Buffalo" Type "BLH" Fan maintains a high mechanical efficiency over a very broad operating range with a peak efficiency of 86%. And it does this smoothly, quietly and most economically because of a number of important "Buffalo" design factors:

• Streamlined housing is uniquely engineered to provide smoothest air flow, highest possible static conversion and excellent pressure distribution at fan outlet.

• Minimizing turbulence are the smooth inlet bell, directional inlet vanes (standard, matching variable inlet vanes are optional) backward-curved blades, rotor flange curved to match inlet bell and the gradually divergent outlet. These features also result in extremely efficient performance and outstandingly stable operation from free delivery to shutoff.

• The 82 year old "Buffalo" reputation for rugged, dependable construction insures long, maintenance-free life.

If you're looking for this kind of efficiency and economy in a mechanical draft fan, call your nearby "Buffalo" engineering representative. Or write us for Bulletin FD-905.

"Buffalo"

BUFFALO FORGE COMPANY
Buffalo, N. Y.

Buffalo Pumps Division • Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

VAREX® has less moisture!

New drying technique

results in low watts loss, and

long life expectancy

A combination of two drying methods is used to remove moisture from the inside of a capacitor prior to impregnation with askarel.

1 - - *High temperature.* This part of the combination is limited since above 135 degrees C. the heat will deteriorate the insulating paper.

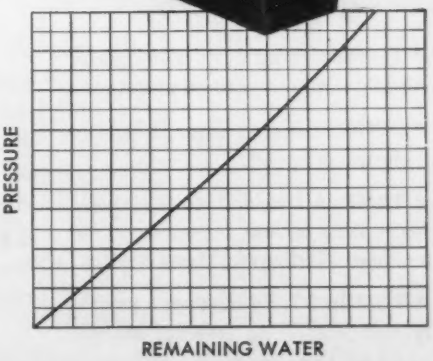
2 - - *High vacuum.* Here the only limitation is the effectiveness of the pumping equipment and the arrangement for coupling it to the capacitor.

O-B has developed a low absolute pressure (high vacuum) drying system for Varex that removes the maximum amount of moisture. This is not just a claim; it can be definitely measured.

Why is this significant to you? The almost complete lack of moisture is reflected in a low power factor for Varex units. Watts loss per KVAR is low, so that less heat is generated in the insulation than in capacitors with higher moisture content.

With less heat, the capacitor insulation lasts longer. And that's why you can expect long life and top performance when cool Varex capacitors are installed on your lines.

OHIO BRASS COMPANY, MANSFIELD, OHIO



For a given temperature, the lower the drying pressure the more moisture is removed. Drying pressure for Varex is on the order of 15 microns.

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4868-H

RT&E Transformers

Weather Protected to Serve Longer

Like the postman, neither rain nor snow, nor hail, nor salt spray can prevent R T & E Transformers from doing their duty. Here's proof that every R T & E unit is completely "WEATHER PROTECTED."

- **FINISH:** Three coats of modified Alkyd paint for all season protection.
- **DESIGN:** Domed cover for immediate water run-off.
- **TANK:** Arc-welded seams and absence of lip on tank bottom mean no moisture collecting cracks and crevices.
- **BUSHINGS:** HV bushings internally clamped — no external clamps and bolts to corrode.

Plus stainless steel cover band to eliminate corrosion on accidentally scratched areas . . . stainless steel threaded mounting pads . . . all unpainted fittings either galvanized or electro-tinned.

R T & E "Weather-Protected" Transformers last longer, require less maintenance, serve better all year 'round.

Equipment to help provide power for America.

RT&E
CORPORATION
WAUKESHA, WISCONSIN • PORTLAND, OREGON

6 Ljungstroms® go to work for the city of Memphis ...and so does lifetime Air Preheater service

The City of Memphis Light, Gas and Water Division has just installed three boilers served by six Ljungstrom preheaters. Why Ljungstrom preheaters? One reason is service. Air Preheater engineers don't just wait for a call. They regularly inspect and help maintain Ljungstroms *through the life of each unit.*

What's more, Air Preheater provides rapid *factory* service in an emergency. Here's an example. A customer phoned on a Friday morning for a replacement trunnion—a major integral part of the preheaters. His Ljungstrom was 17 years old, which meant that a new trunnion had to be custom made to match his older-style. He was located 500 miles away. And he needed his boiler back on the line by Sunday.

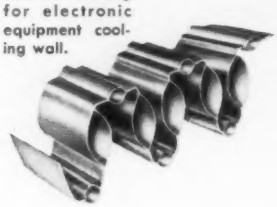
Air Preheater went to work. Special trucking was arranged. The job was done *and shipped* that same evening. The customer had the trunnion by Saturday morning and the boiler was back on the line by Saturday evening!

Fast response to emergencies and regular inspection of Ljungstrom installations are two of the many advantages Air Preheater provides its customers. Another is expert knowledge of boiler and preheater problems —and how to lick them—gained from over 35 years of experience. Perhaps these reasons explain why 9 out of 10 preheaters sold today are Ljungstroms. For further information write today for free illustrated brochure.

THE AIR PREHEATER CORPORATION

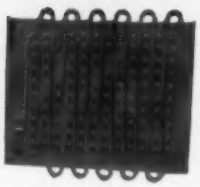
60 East 42nd Street, New York 17, N. Y.

Ljungstrom rotor being installed for the City of Memphis Light, Gas and Water Division. Six such Ljungstroms—each with 201,400 sq ft of heating surface—will serve three boilers. The boilers will each evaporate 2,000,000 lbs of steam/hr and have a combined nameplate capacity of 750,000 kw. A fourth boiler unit is now under consideration. Burns and Roe, Inc. designed and supervised construction.

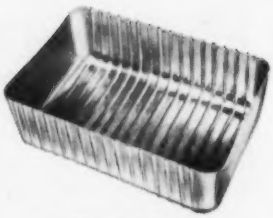


Section of Aluminum Tube-In-Strip combining refrigerant passages with air cooling for electronic equipment cooling wall.

Copper Tube-In-Strip used as a combustion chamber for water heater.



Copper Tube-In-Strip with return bends attached to produce a cooling plate.



This electronic cooling case of Revere Aluminum Tube-In-Strip was inflated after drawing.

REVERE *Tube-In-Strip* SCORES

NOW USED AS WATER-COOLED BUS BAR in manufacture of General Electric Semiconductor Rectifiers

HAS THESE 4 BIG MONEY-SAVING ADVANTAGES

1 Because it is a homogeneous mass Revere Tube-In-Strip eliminates the possibility of leaks.

2 User is able to obtain more efficient cooling.

3 If user finds it necessary to change cells it can be done without draining the system.

4 Revere Tube-In-Strip enables user to have a completely sealed system, thus eliminating O-rings or gaskets.

The use, by General Electric, of Revere Tube-In-Strip as water-cooled bus bar is still another of the myriads of ways this revolutionary product can be applied in industry.

The unique thing about Revere Tube-In-Strip is that it is a solid piece of metal, not two strips welded, brazed or bonded together. You buy strip, fabricate it as you wish, stamping, bending or forming it, and then as a final operation inflation expands the integral channels into tubes. Expanding in the open, the tubes are round; by expanding into dies, the tubes can be made rectangular, fluted, half-round, hexagonal, etc.

Revere Tube-In-Strip saves on first cost, and in fabrication. New and improved designs are made possible. The web between the tubes conducts heat faster. The vastly increased structural strength means you can use lighter gauges, saving in weight and price.

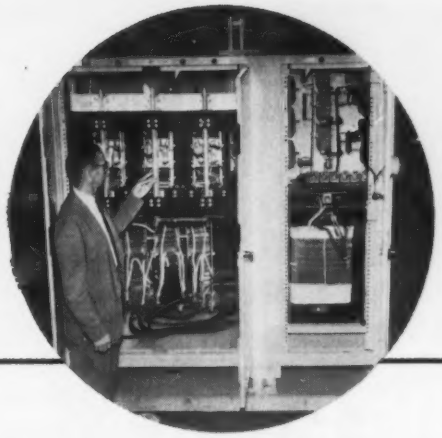
Revere Tube-In-Strip is available in Copper, Copper-base alloys and Aluminum alloys. The Revere Technical Advisory Service and the Research and Development Department will gladly collaborate with you in taking full advantage of this marvelous new material.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

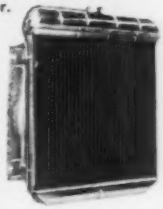
Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

Copper Tube-In-Strip spiral containing both water and refrigerant passages for increased cooling efficiency.



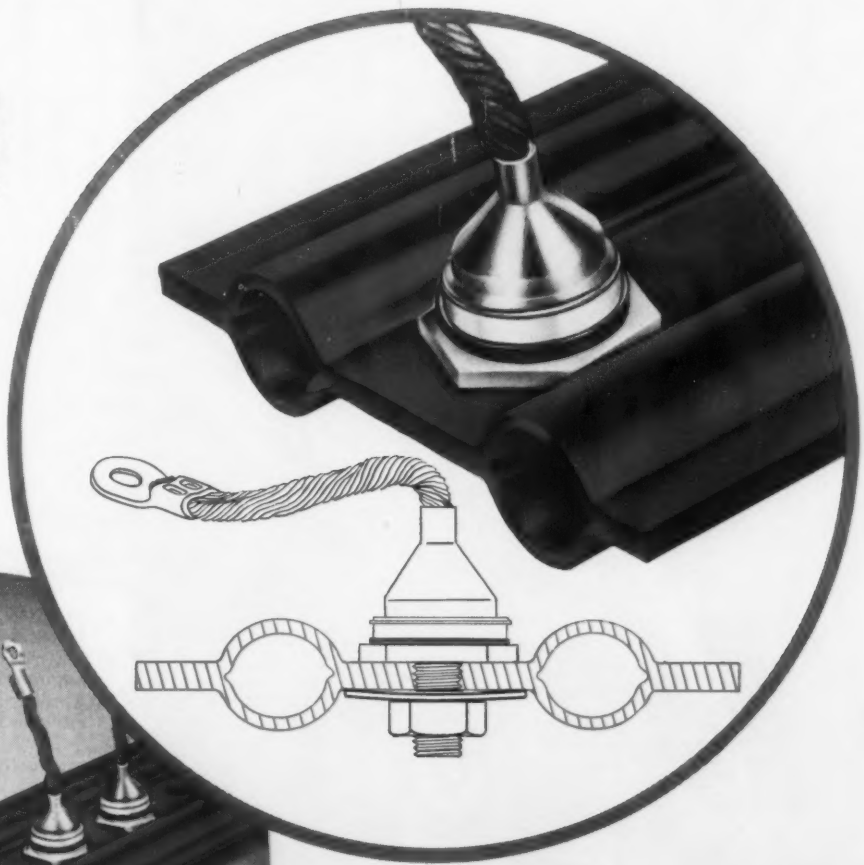
Copper Tube-In-Strip and finned stock assembled and then inflated into automotive air conditioning coil.

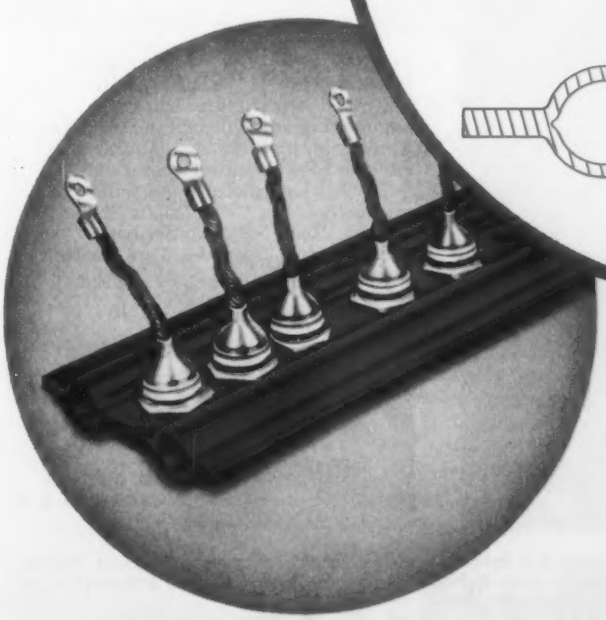
Copper Tube-In-Strip and copper fin assembly for automobile radiator.



ANOTHER TRIUMPH!

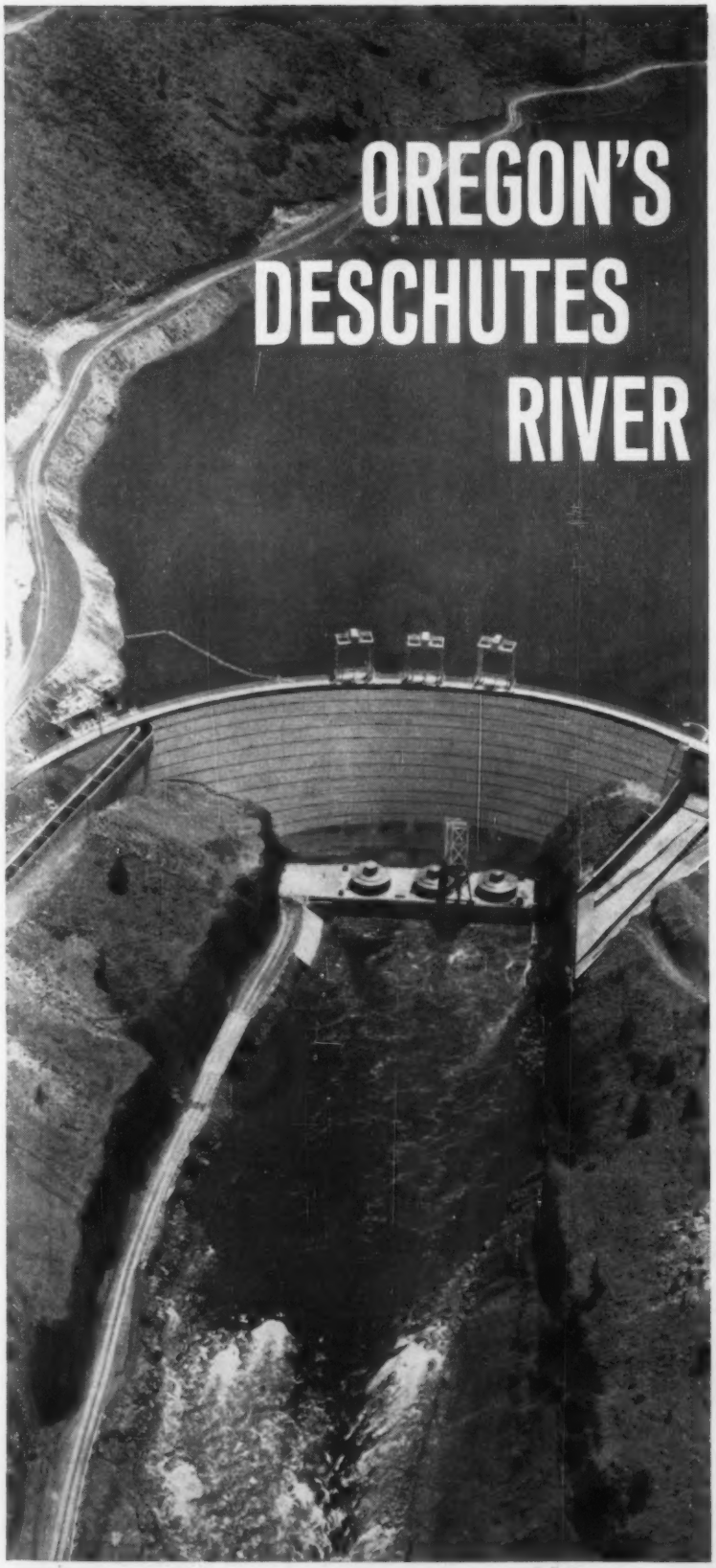
PHOTO IN CIRCLE ABOVE SHOWS water-cooled semiconductor power rectifier design with integrally mounted transformer as made by General Electric Company. Rated 150 volts, 4000 amps., d-c, it is used for copper refining.





(Above) **CROSS SECTION** of water-cooled bus, featuring improved cooling method. Dual, leak-proof water passages are formed in solid bus, made from Revere Tube-In-Strip, without the need for welding or brazing. They are located on each side of a section of bus to which silicon cells can be bolted without penetrating the coolant passages.

(Left) **OVERALL VIEW** of new sealed liquid-cooled bus illustrating manner of mounting several silicon rectifier cells. Unique "dry" mounting permits installation of cells without draining liquid from bus. Cells are individually attached to the bus with threaded stud and nut, simplifying the mounting of a cell, and making it unnecessary to disturb any of the other cells on the bus.



OREGON'S DESCHUTES RIVER HARNESSED IN RECORD TIME

Just twenty months and two days after the construction contract had been signed, Pelton Hydroelectric Development was completed, breaking all records for speed of construction of hydro plants and resulting in reduced investment cost for the project.

Engineering and construction was handled by Ebasco for Portland General Electric Company. The 120,000 kilowatt project is the thinnest arch dam for its height ever built in the United States. It is 204 feet high, 8 feet thick at top, 25.5 feet thick at the base, and 636 feet long.

The experience that helped put Pelton "on the line" in record-breaking time is available to all industries everywhere. Ebasco engineering and construction services range from preliminary planning and site selection to initial operation.

For further information, write for our booklet, "The Inside Story of Outside Help," Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, New York.

ENGINEERS · CONSTRUCTORS
EBASCO
BUSINESS CONSULTANTS

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Consulting Engineering • Design & Construction • Facilities Planning • Financial & Business Studies • Industrial Relations • Insurance, Pensions & Safety • Purchasing, Inspection & Expediting • Rates & Pricing • Research • Sales & Public Relations • Systems, Methods & Budgets • Tax Valuation & Appraisal • Washington Office

Change hats
with your maintenance man . . .

You'll find out . . .

Vertical Lift Metal-clad is safer; you can <u>see</u> when it's disconnected

Peace of mind means a lot when your work involves contact with thousands of volts of electricity. Ask your maintenance man which make of metal-clad gives him peace of mind, and he'll tell you G-E Vertical Lift. He can see when the primary disconnects are parted—no need to guess whether or not the breaker is safely open. And, all live parts are automatically shielded as the breaker disconnects.

Before you buy your next switchgear line-up, consider your maintenance man and the see-able peace of mind only Vertical Lift Metal-clad can give him. General Electric Company, Schenectady 5, New York. 511-32

Progress Is Our Most Important Product

GENERAL ELECTRIC

When you consider expansion . . . the most important investment you can make is in the creative ability of men.

FLUOR

Engineers and Constructors

Design in three dimensions

At Fluor's Los Angeles headquarters, there is an 8,000-square-foot building where 30 plant designers work with 20 professional modelmakers. Drafting tables are within 10 feet of model assembly tables. Another building contains an elaborate photographic studio where precisely scaled isometric and plan views can be taken under shadowless lighting.

All this began seven years ago when Fluor engineers built a scale model and rigged miniature hoists to solve a difficult erection problem. Success of this trial led to experiments with the use of models as a basic design tool. Cost studies showed substantial savings in drafting man-hours (net savings, above modelmaking costs.)

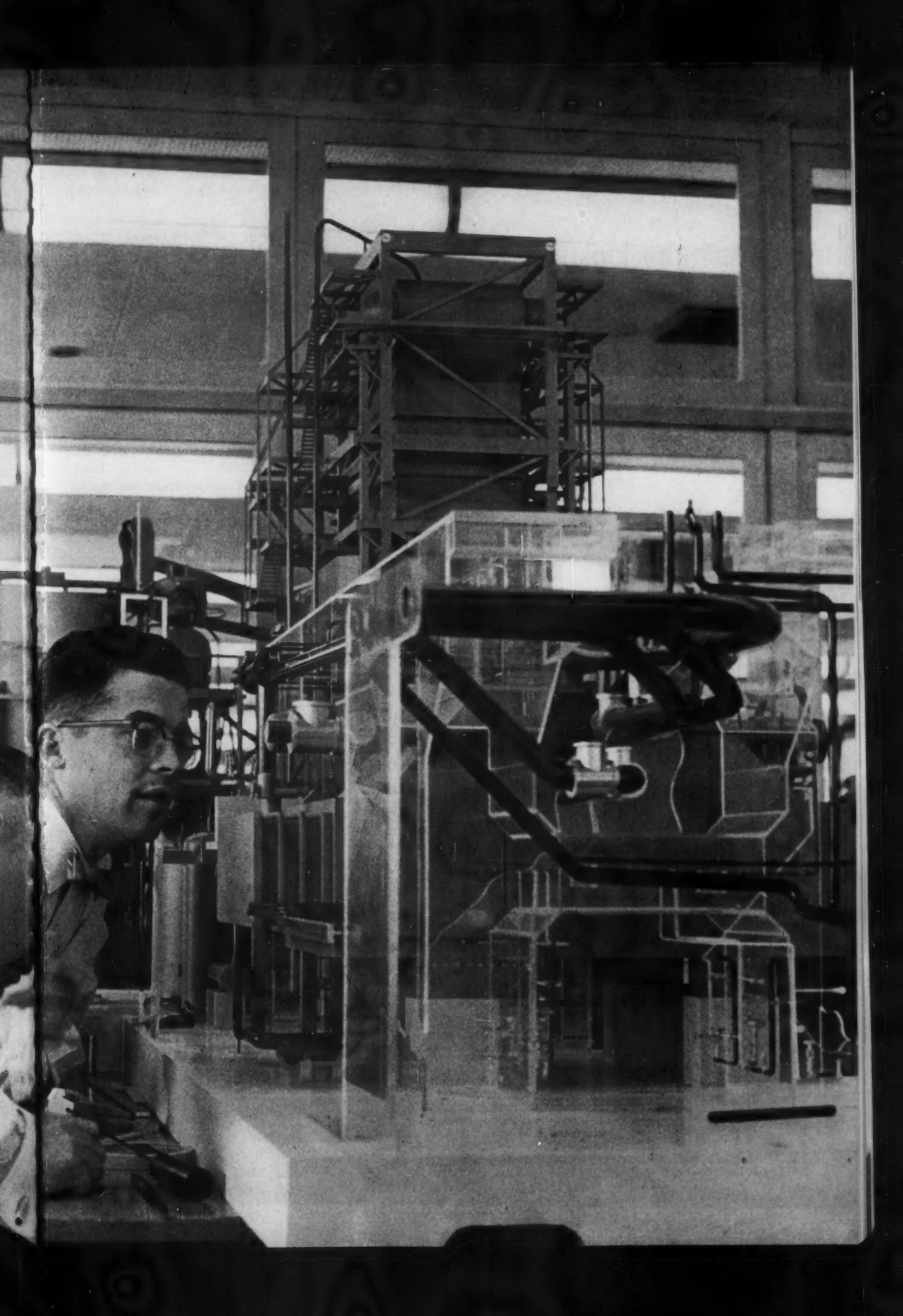
Today, models are to be found in most of Fluor's drafting rooms, and nearly all Fluor-built plants are designed with the aid of this tool. Beyond the dollar savings there are many less tangible benefits. Sizable groups can confer over a model, reach quick agreement on layouts, approve or revise many details at a single session.

Piping runs are shorter and more direct, valves and instruments are more accessible when designers lay them out on a model (a Fluor comparison study of a refinery design showed a $50,000 saving in pipe, fittings and fabrication by use of a model vs. conventional layout drawings.)

Costly revisions are minimized when many specialists can study a complete plant in miniature before construction begins. In the field, models serve as a reference for construction crews and a guide for operator training.

Unless scale models are properly used—as a basic, integrated design tool—most of these advantages are lost. The development and refinement by Fluor of design techniques using scale models has been a creative contribution to the engineering and construction industry.

For more information on the use of scale models in design and construction, write to Dept. 66, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.



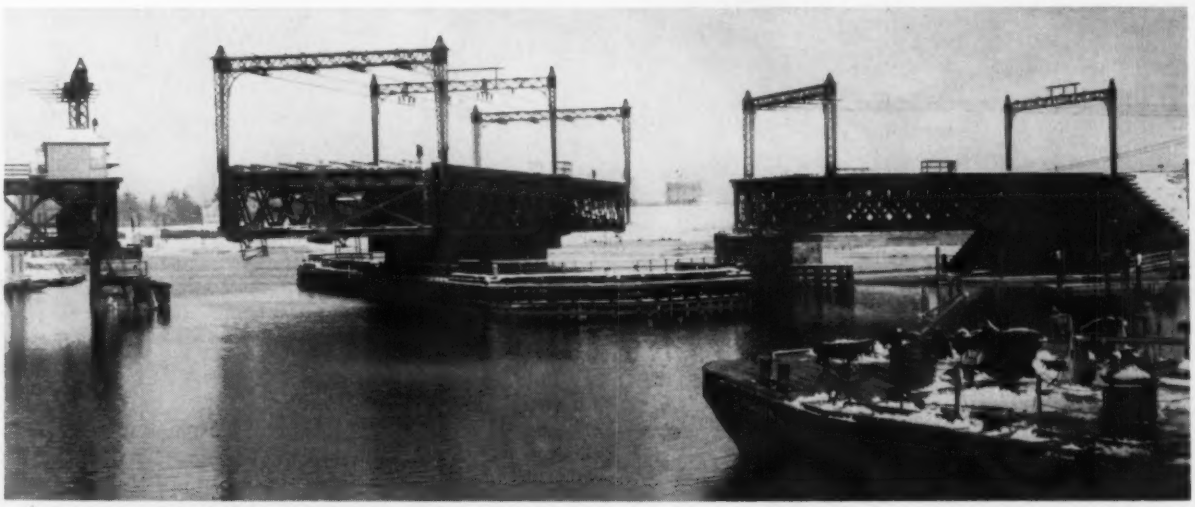
Neoprene jacket protects Simplex cable from salt water

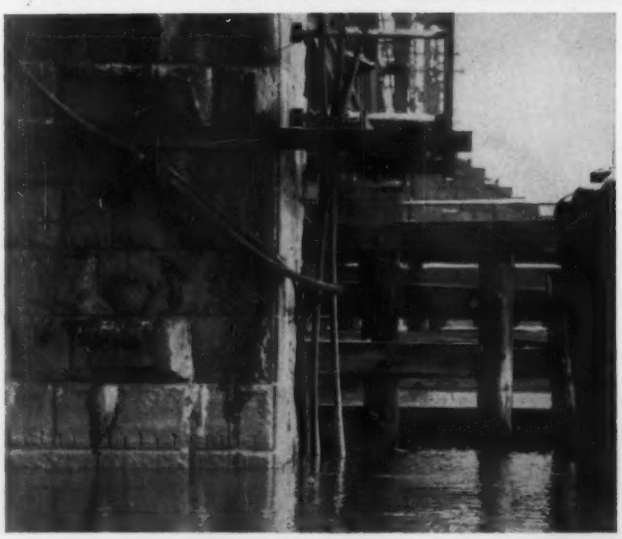
Cable maintenance was a constant problem on 14 movable span bridges of the New York, New Haven and Hartford Railroad. Tidewater corroded the steel armor jacketing on the submarine cables (running from operator's cabin to center pier rotor motor) and eventually led to cable failure.

In 1957, Simplex Wire and Cable Company recommended cable jacketed with Du Pont neoprene to replace the original cable on the bridge shown below. The superior construction of the neoprene submarine cable has provided lasting protection from corrosion. In addition, the resilient neoprene sheath protects the cable from damage by floating ice and debris.

On the basis of this performance, the railroad plans ultimately to replace all their armored submarine cable with the neoprene-jacketed construction.

For durability and long-term economy, specify wire and cable jacketed with neoprene. For more about neoprene, write to: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. EW-4, Wilmington 98, Del.





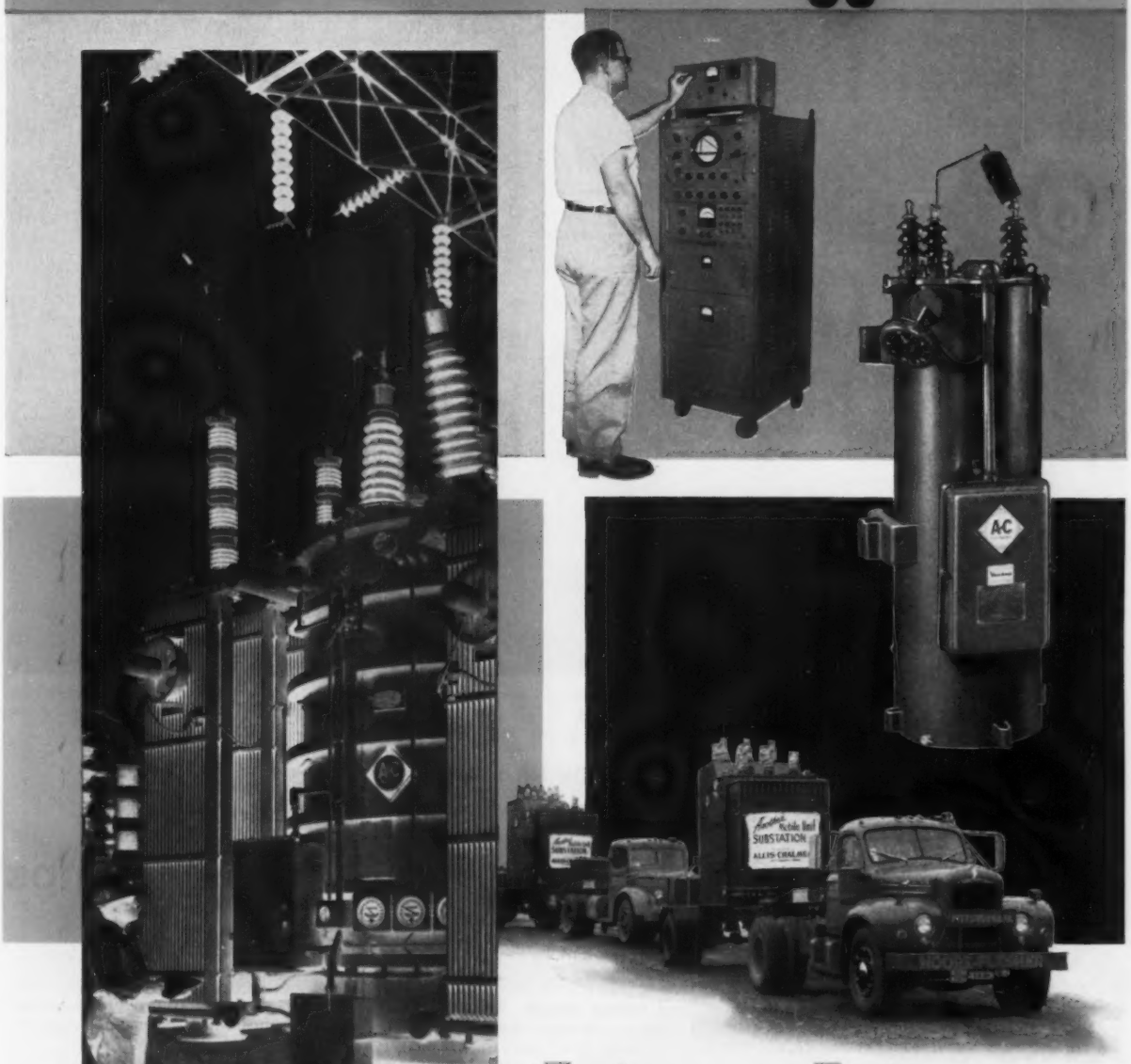
DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

SYNTHETIC RUBBER

NEOPRENE
HYPALON®
VITON™
ADIPRENE®

ALLIS-CHALMERS modern line for '59



Extras...Extras...

Read all about them

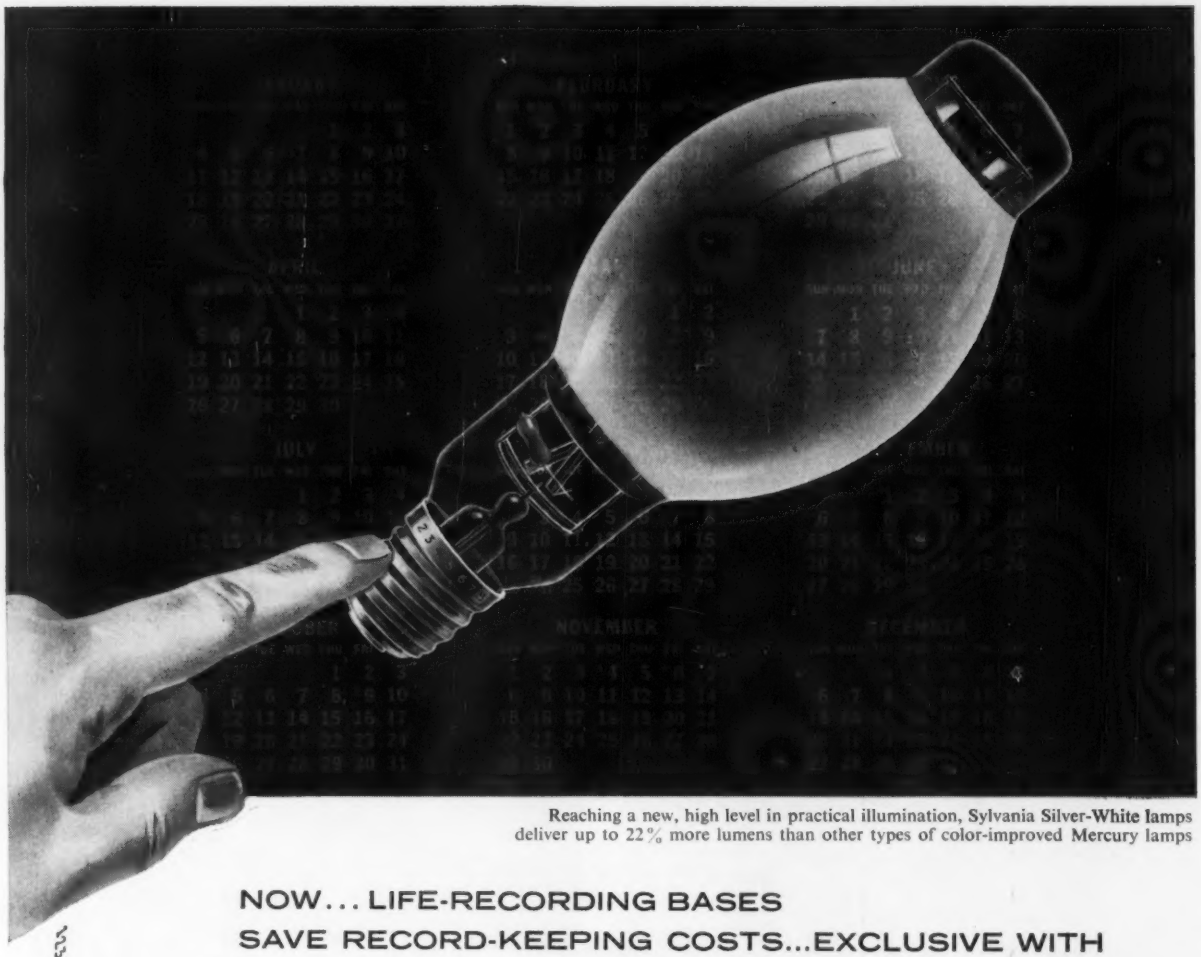
It's the extras that make the difference in the electrical equipment field today! There's much standardization today, but there's still room for the designer's genius. There's still room for features resulting from research or field experience.

While you're buying — update! And to update — look for the extras. They make the difference.

Some of the extras Allis-Chalmers offers are shown on the following pages. Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5908-E



Reaching a new, high level in practical illumination, Sylvania Silver-White lamps deliver up to 22% more lumens than other types of color-improved Mercury lamps

NOW... LIFE-RECORDING BASES
SAVE RECORD-KEEPING COSTS...EXCLUSIVE WITH

Sylvania *Ruggedized* Mercury Lamps

A scratch of a simple tool, such as a screwdriver, easily records the month and year when a Sylvania "Ruggedized" Mercury Lamp is installed. This simple built-in record-keeper eliminates expensive records and time... is an instant aid in figuring installation costs accurately.

The recording base, however, is but only one reason to consider Sylvania "Ruggedized" Mercury Lamps for all of your highway, street lighting needs as well as high-bay industrial installations.

For example, Sylvania "Ruggedized" Mercury Lamps right now provide users across the country with all these important, *exclusive*, cost-reducing benefits:

Increased lumen output. Recent phosphor improvements boost the Silver-White Phosphor-Coated SH-1 lamp from 23,000 lumens in 400 watts to 25,000 lumens—the most efficient commercial mercury lamp (62.5 lumens per watt) available today.

9000 hours average usable life. You get the equivalent of two years' street lighting service. Built for long life and high lumen maintenance, these lamps have increased from 7000 to 9000 usable hours.

Ruggedized glass (PYREX brand bulbs) protects against moisture and condensation, moisture-laden or humid atmospheres, thermal shock.

Ruggedized construction throughout. Arc tube supports are specifically designed to resist and protect the lamp from destructive shocks and vibrations.

Guaranteed performance. Free exchange on any lamps which burn out during the first 1000 hours.

A complete line of Ruggedized Lamps covers a range of 400-, 425-, 700- and 1000-watt sizes . . . Silver-White (*Kolor-Keyed*), Clear and Color-Improved types . . . 25,000 to 62,000 lumens output.

Let Sylvania's staff of lighting engineers help evaluate your present and future lighting requirements, without obligation. For information or literature, call your Sylvania representative or write:

SYLVANIA LIGHTING PRODUCTS
Dept. 9L-7604, 60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O," Montreal 9

SYLVANIA
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

ALLIS-CHALMERS modern line for '59

Caliband control provides accurate settings quickly . . . eliminates customer complaints

Now you can set or test voltage level and band width without changing customer voltage or interrupting regulated service. A twist of the *Caliband* control knob does it.

Caliband control demonstrator

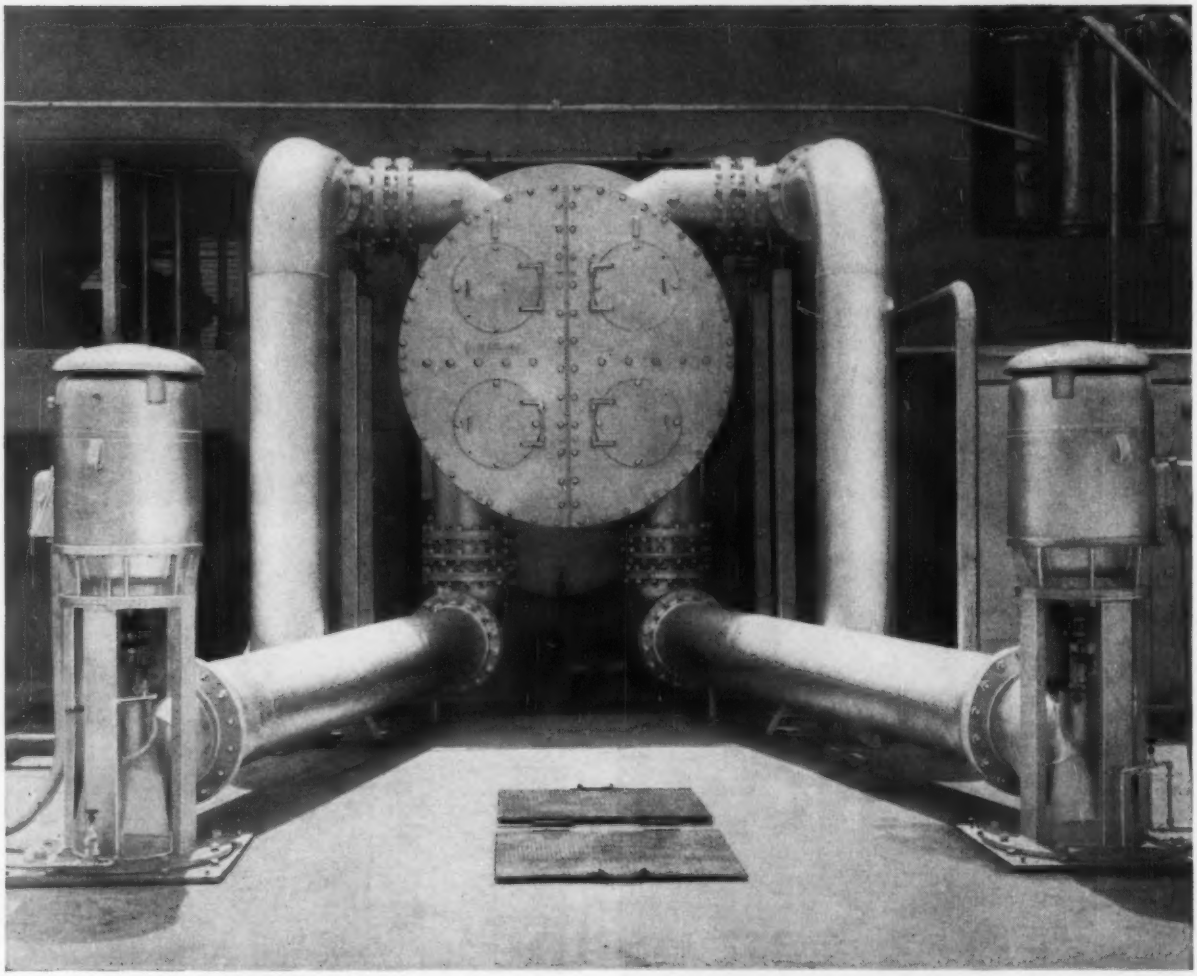
Ask an A-C engineer to demonstrate *Caliband* control at your desk with an actual unit in a portable kit. Contact your nearby A-C office for a demonstration, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Caliband is an Allis-Chalmers trademark.

A-5904

ALLIS-CHALMERS

Originators of 5/8% step regulators



This power plant was designed and built by the Crisp County Power Commission, Cordele, Georgia.

First planned gas-steam turbine station depends on C. H. Wheeler equipment!

The first power plant in the United States designed from the beginning as a combined gas turbine-steam turbine station, is now in operation!

This combined-cycle, 15,000 kw plant at Warwick, Ga., satisfies the daily peak-load condition as well as base-load requirements. The system is unusually flexible; it can operate with the steam turbine only, or in combination with the gas turbine.

C. H. Wheeler equipment now in service at this history-making station includes a 10,000 sq. ft. Dual Bank, Two-Pass Condenser and two 12″ x 16″ Vertical Mixed Flow Pumps shown above (which supply 10,300 gpm of cooling water) . . . two Horizontally Split Case Condensate Pumps, a Tubejet® Steam Jet Vacuum Pump and a Hogging Ejector.

This equipment symbolizes the contribution C. H. Wheeler makes to the efficient, economical operation of steam generating plants everywhere.

Depend on C. H. Wheeler Condensers for:

- ***Pure condensate***
- ***Lower absolute pressure, higher vacuum***
- ***"Zero" condensate temperature depression***
- ***Deaeration to 0.03 cc. per liter with special designs providing deaeration to 0.01 cc. per liter***
- ***Patented Reverse Flow for faster, easier cleaning of tubes and tube sheets***

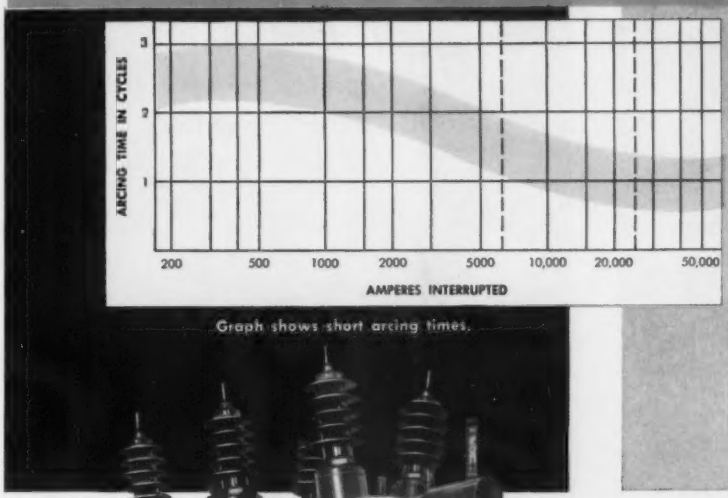
C. H. WHEELER MFG. CO.

19th and Lehigh Avenue • Philadelphia 32, Pennsylvania

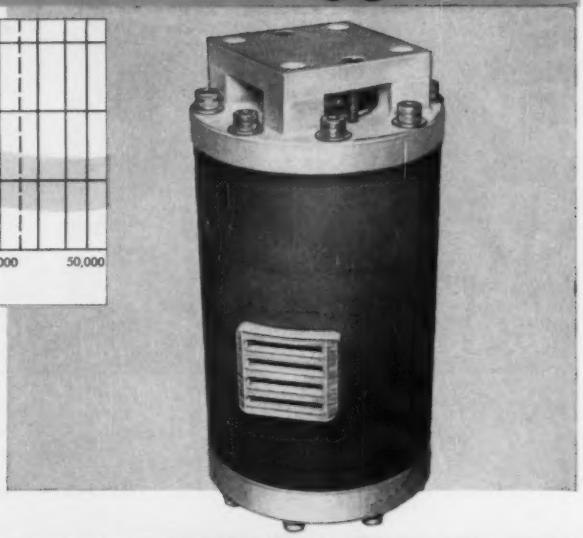
Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

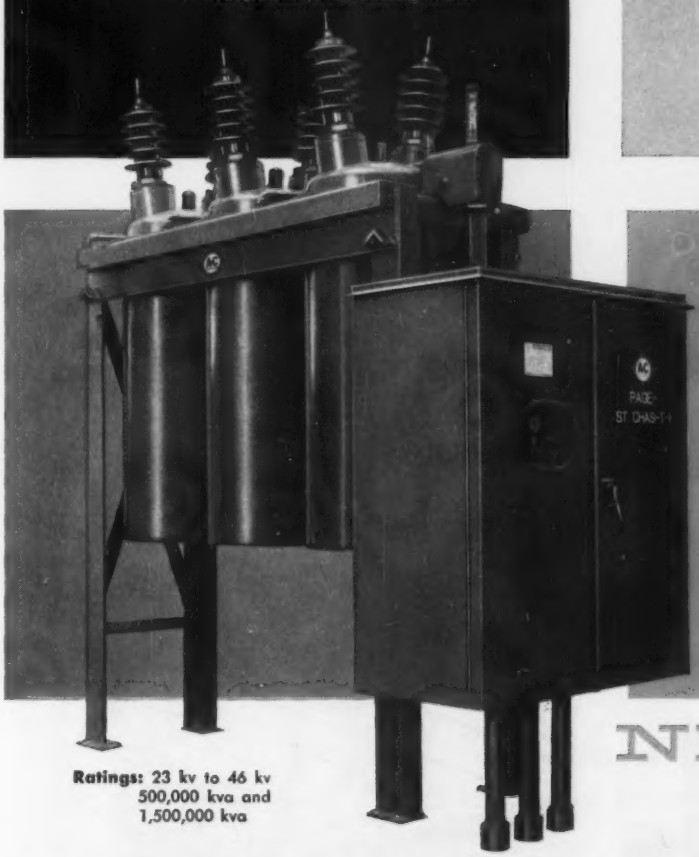
Steam Condensers • Steam Jet Vacuum Equipment • Centrifugal, Axial and Mixed Flow Pumps • Marine Auxiliary Machinery • Nuclear Products

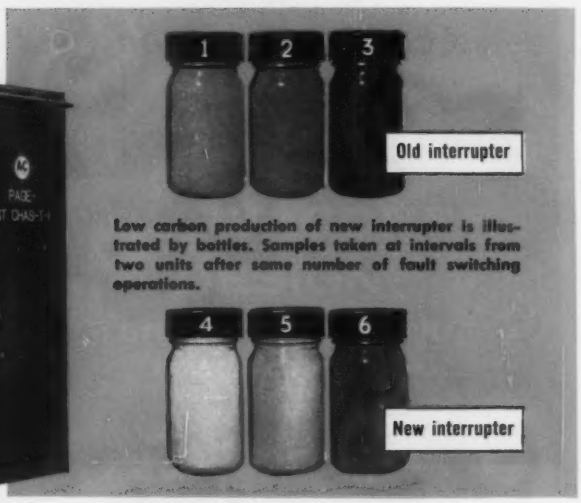
ALLIS-CHALMERS modern line for '59



Graph shows short arcing times.







Low carbon production of new interrupter is illustrated by bottles. Samples taken at intervals from two units after same number of fault switching operations.

Ratings: 23 kv to 46 kv
500,000 kva and
1,500,000 kva

NEW interrupter cuts oil contamination

Reduced arcing time . . . less carbon . . . characterize new interrupting device for Allis-Chalmers frame-mounted breakers.

Contamination due to circuit interruption is greatly reduced . . . dielectric strength is extended.

Tests consisted of fault switching operations at current levels of 200 to 40,000 amperes.

Five-cycle operation

This new interrupting device with its matching high-speed *Pneu-Draulic* operator provides fast operation: closing, reclosing and interruption.

For complete details on Allis-Chalmers frame-type breakers, contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

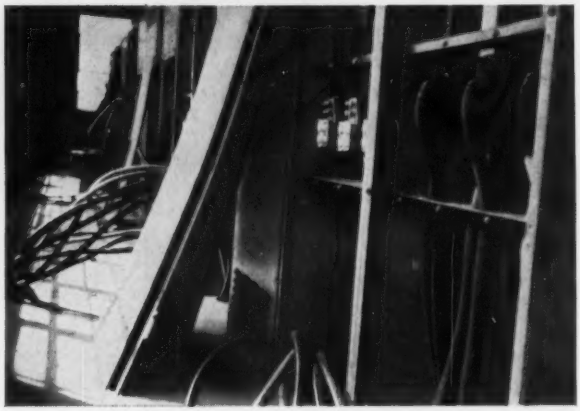
Pneu-Draulic is an Allis-Chalmers trademark.

A-5916-E

ALLIS-CHALMERS

Installed in underground ducts, Paranite Super Pararite-Paraprene® network cable services a modern electronic computor installation.

Paranite Super Pararite-Parasyn cables carry primary power between transformers and switchgear control panels in an ore reduction plant.



Across the nation for trouble-free installations...

PARANITE®

"IF IT'S PARANITE IT'S RIGHT"®

Paranite Super Pararite-Paraprene cable serves as the primary transformer feeder in a new municipal water pumping station.

Overhead duct installation of Paranite Super Pararite-Parasyn® (PVC) serves as a secondary feeder cable in a manufacturing plant.

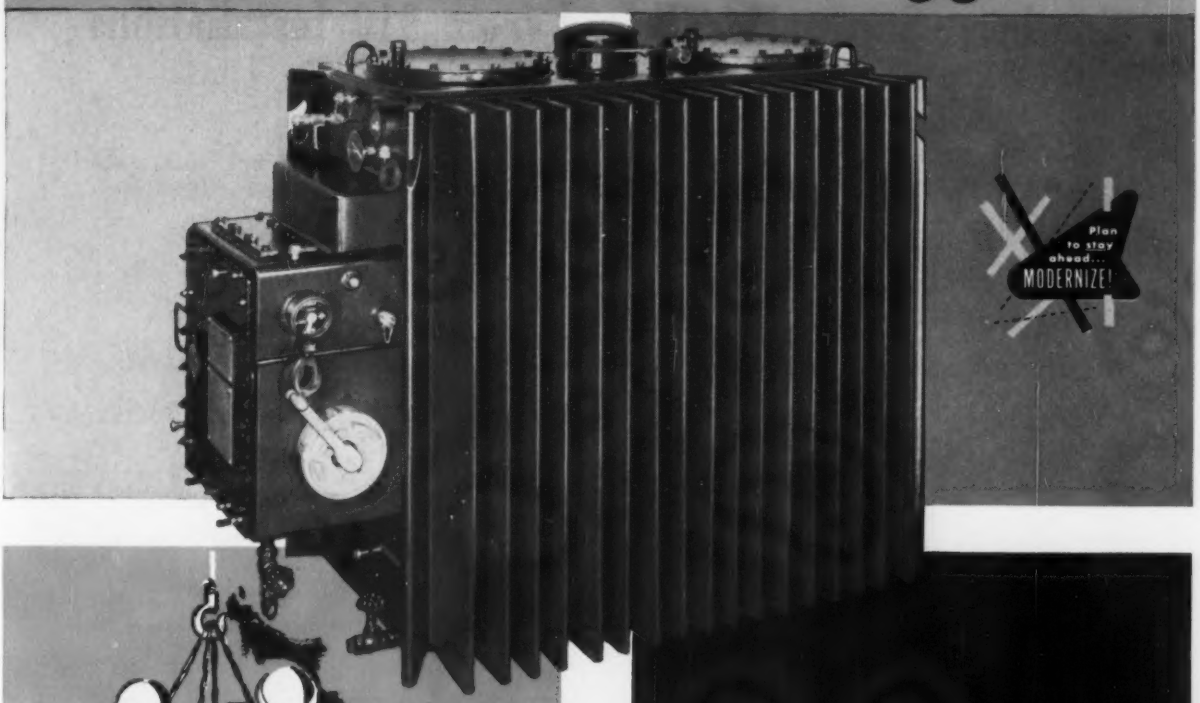
The consistent selection and performance of Paranite cables from 600 volt network through 23,000 volt power cables mark them as products of close quality control. These Super Pararite-Paraprene and Super Pararite-Parasyn (PVC) cables illustrated above, indicate the versatility, national availability and proven trouble-free performance of Paranite installations.

PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation, Fort Wayne, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Birmingham, Ala.; Anaheim, Calif. • Sales Offices in All Principal Cities

ALLIS-CHALMERS modern line for '59



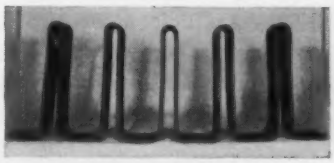
CURVACORE DESIGN shrinks network transformers

reduced size and weight cut installation costs

Smaller vault requirements per kva! That's the big economy advantage of the new Allis-Chalmers network transformer. Sizable savings in excavation and construction costs take much of the sting out of high labor rates. With a smaller, lighter transformer to handle, work crew efficiency is improved in installation. And, of course, increased kva may be installed in existing vaults where system growth requires it.

Utilities gain, too, in improved performance. Use of quality controlled *Curvacore* construction and advanced design techniques assure greater efficiency... lower exciting current and lower losses.

For detailed information on this compact transformer, call your local Allis-Chalmers representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



Corrugated tank slashes maintenance

All cooling surfaces are accessible for repainting by brush, spray or flow. Simplified preventive maintenance reduces chance of corrosion damage. Tank retains its original high strength.

Curvacore is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5939-E

There Is No Magic Formula for Producing Substations, as Southern States Has Found from 910 Installations

As much as we like the idea of standardization, the one thing we have learned is that there is no cut-and-dried, assembly-line, easy way to produce substations.

We've been at it 28 years, producing more than 900 substations of all kinds, and it has always been tough for us!

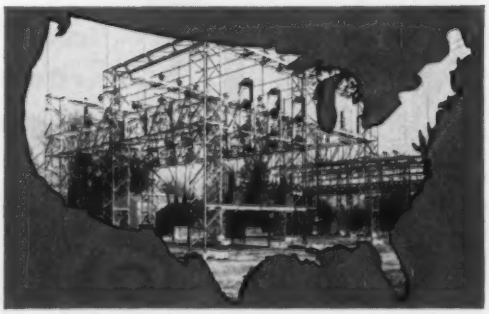
Even stations with essentially the same assignments have endless arrangements. Infinite combinations of design preclude standardization. Each station must be virtually a custom-made project.

True, hundreds of designs in our files are helpful. Many standard components are picked up and used, with ultimate savings to our customers. And the practical experience of our design staff guides us around many pitfalls.

But you can't escape the fact that supplying substations requires these basic functions: skillful engineering, careful detailing, precise coordination of production schedules, and delivery on time. At least, that's what we've learned. And that's how Southern States approaches every substation assignment.

On this basis, you might like to do business with us. We'll welcome your inquiry. Just call your Southern States representative or write direct to us.

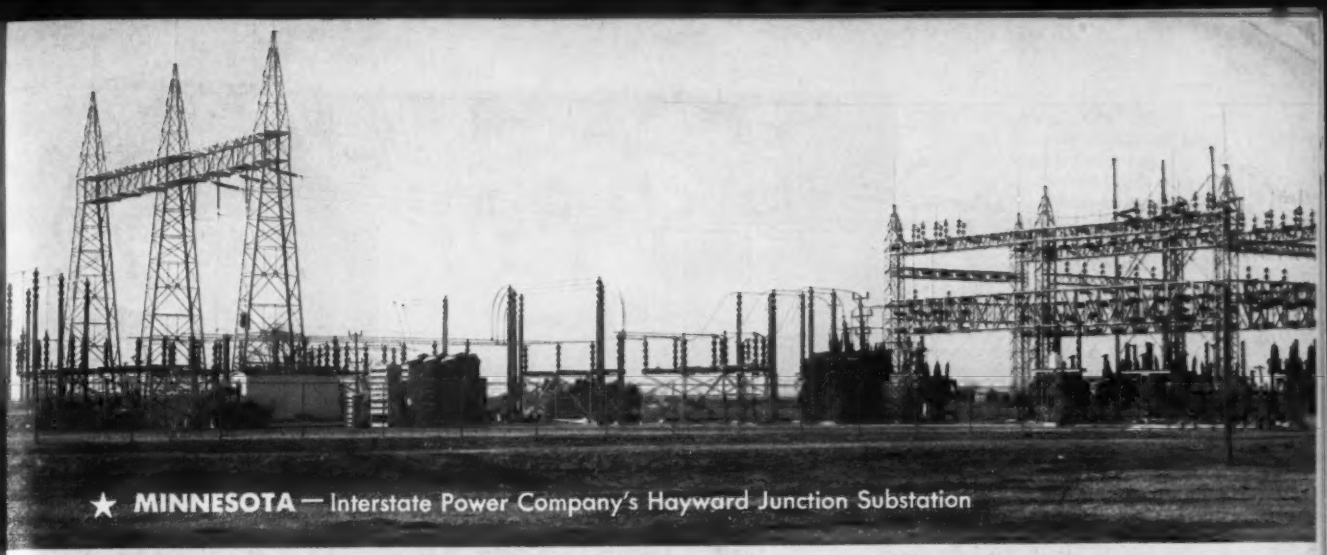
SOUTHERN STATES SUBSTATIONS ARE IN USE ALL OVER THE NATION



During the past 28 years Southern States has produced 910 outdoor substations for hundreds of different customers. The stations range from small 5,000 kva units to switchyards exceeding 1,000,000 kva. Regardless of size, Southern States pays close attention to every detail—from the single-line wiring diagram to the finished station.

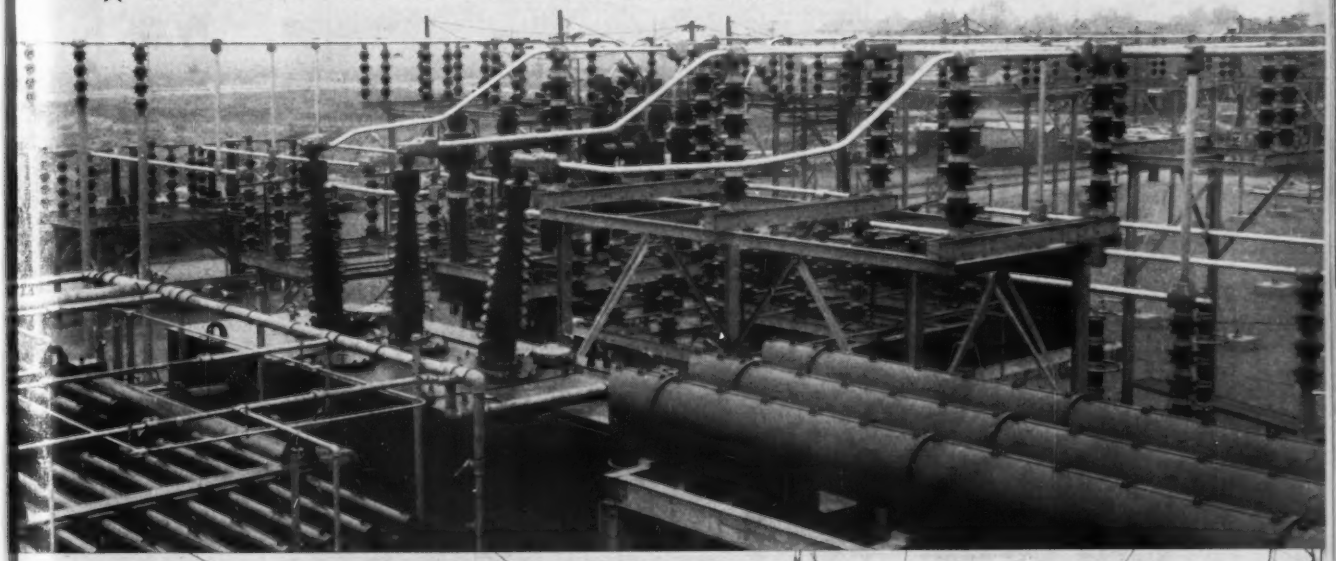
SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

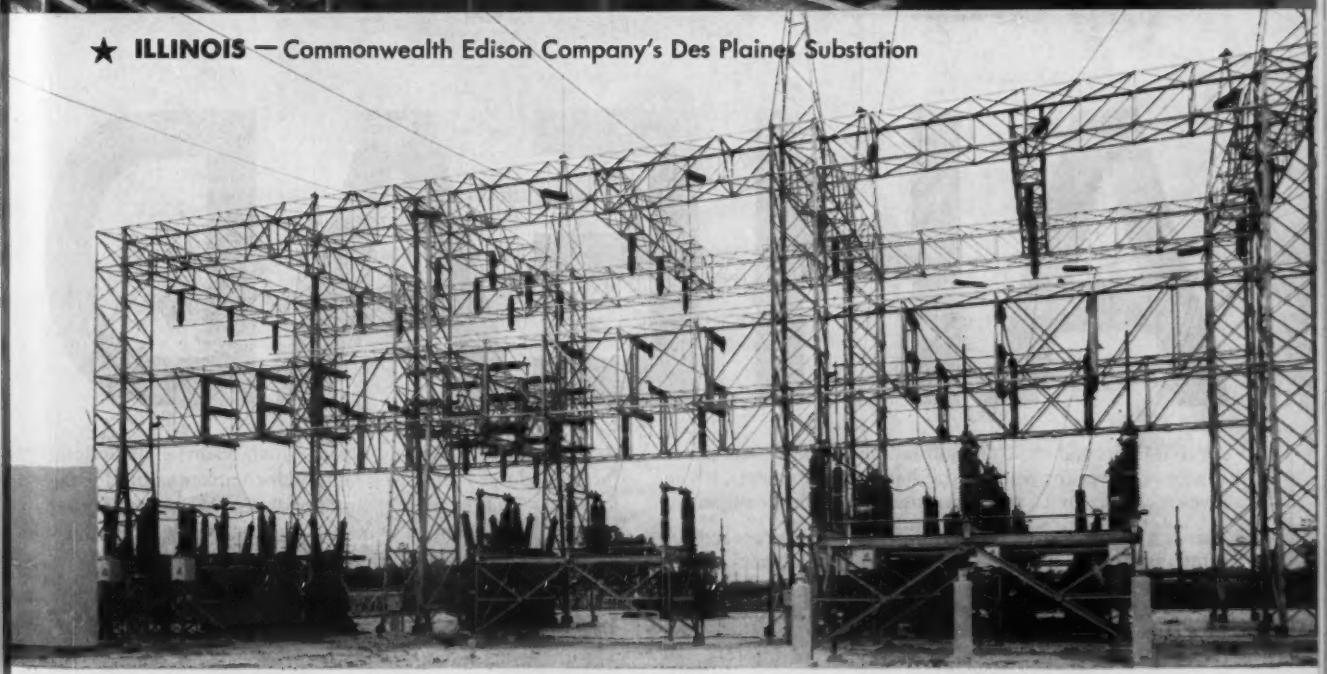


★ **MINNESOTA** — Interstate Power Company's Hayward Junction Substation

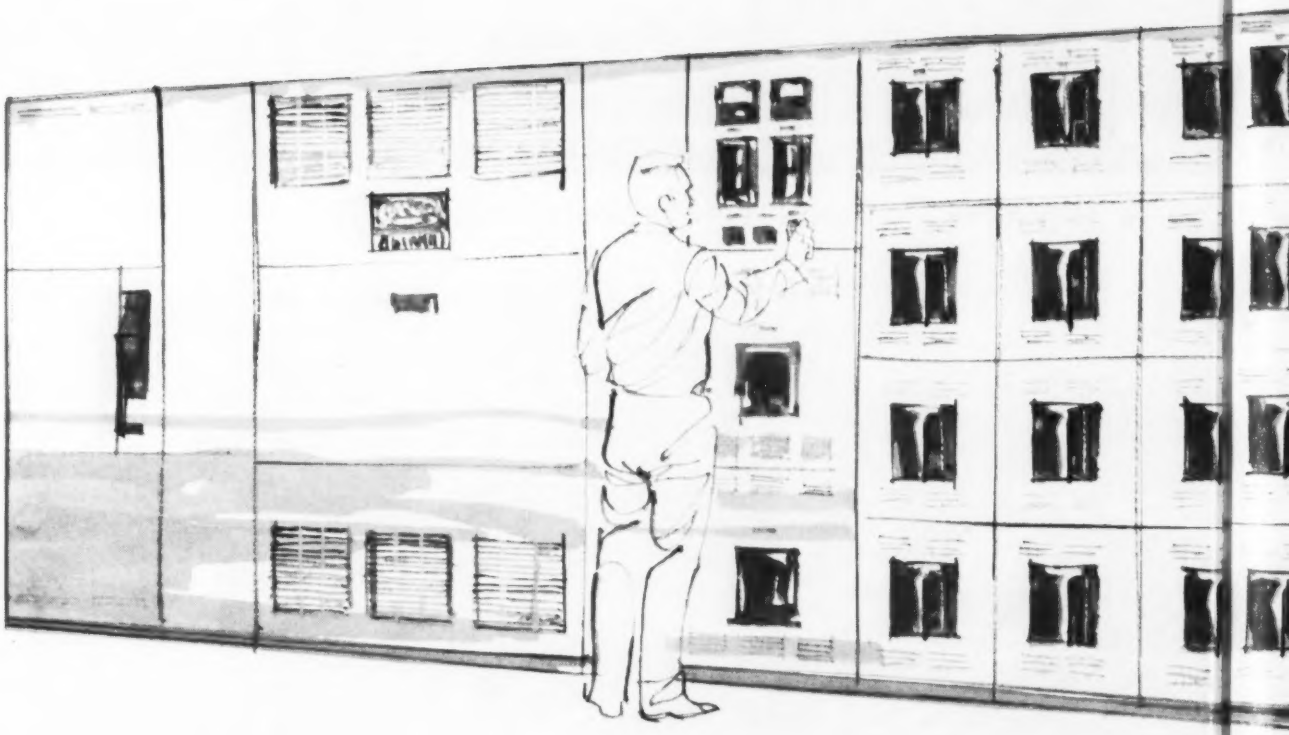
★ **NEW YORK** — Consolidated Edison's Corona Substation



★ **ILLINOIS** — Commonwealth Edison Company's Des Plaines Substation



In each of these substations Southern States worked closely with the utility, designing and detailing the structures; and supplying many components, including structural steel, air break switches, disconnects, buses, cable conductors, connectors, and bus supports.



AHEAD

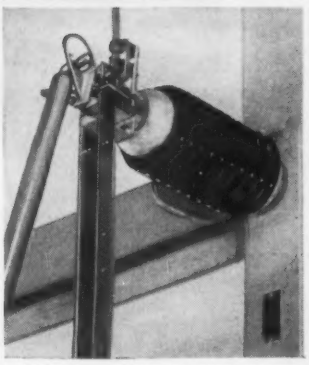
An I-T-E Secondary Unit Substation is more than just a source of power for your central station requirements. It's an investment that puts you years ahead in station equipment.

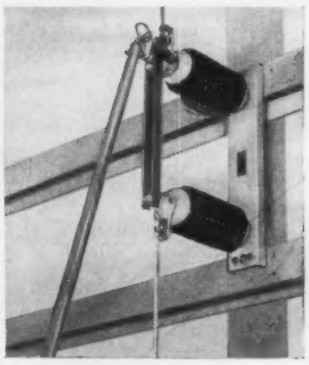
The new I-T-E K-LINE circuit breakers are unmatched for safety, protection and lasting economy. Manual quick-make, extended range trip adjustment, and closed-door disconnect are all combined in a single, compact design. The transformer is built by I-T-E for your own particular application on a basis of fresh engineering ideas original with I-T-E. The I-T-E primary fused interrupter switch or metal-clad circuit breaker closes even into a fault with complete safety for the operator, and the entire substation is assembled and shipped from a single plant . . . you are assured complete coordination, easy assembly, and on-time delivery.

If you want to be ahead in the equipment you buy, look into the broad I-T-E line. Users claim you can't buy better, yet it costs no more.

Safe switching. Yes, there's real economy in fused power switching centers, but make sure you also get the *extra safety* only I-T-E offers. In every I-T-E Power Switching Center, you have the assurance of knowing that switches can be closed *even into a fault* with complete safety for both personnel and equipment. Unique standardized cubicles and building block construction reduce engineering expense (the saving is passed on to you), and also shorten the time between order and delivery. Equipment arrives on the job in sturdy, preassembled units, ready for easy, fast installation.

Disconnect circuit breakers with door closed. I-T-E low-voltage metal-enclosed switchgear gives new operator safety. K-LINE circuit breakers can be moved from connected, through test, all the way to disconnected position without opening door. Overload setting easily adjusted to new load conditions by expanded calibration overcurrent trip device. Manual quick-make affords safer operation and extends contact life. Compact construction permits 4-high mounting of circuit breakers of up to 600 amp rating. K-LINE ratings: 600 v a-c, 250 v d-c, 15-1600 amp continuous.





Hear it snap shut. New I-T-E hook-operated disconnecting switches provide positive indication that they have closed completely. An easily audible "snap" is heard. And extra-large latch members serve as visual assurance. Parallel blades are widely spaced and heavily braced for maximum rigidity. Roomy hook-stick eye and pryout motion in opening contribute to the easy operation of the switch. Ratings: 7.5 through 69 kv, 600 and 1200 amp.

U-3

I-T-E CIRCUIT BREAKER COMPANY
1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Secondary unit substations
- ☐ Power switching centers
- ☐ K-LINE circuit breakers
- ☐ Hook-operated disconnect switches
- ☐ Isolated phase bus
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Reclosers
- ☐ Primary unit substations
- ☐ Other . . .

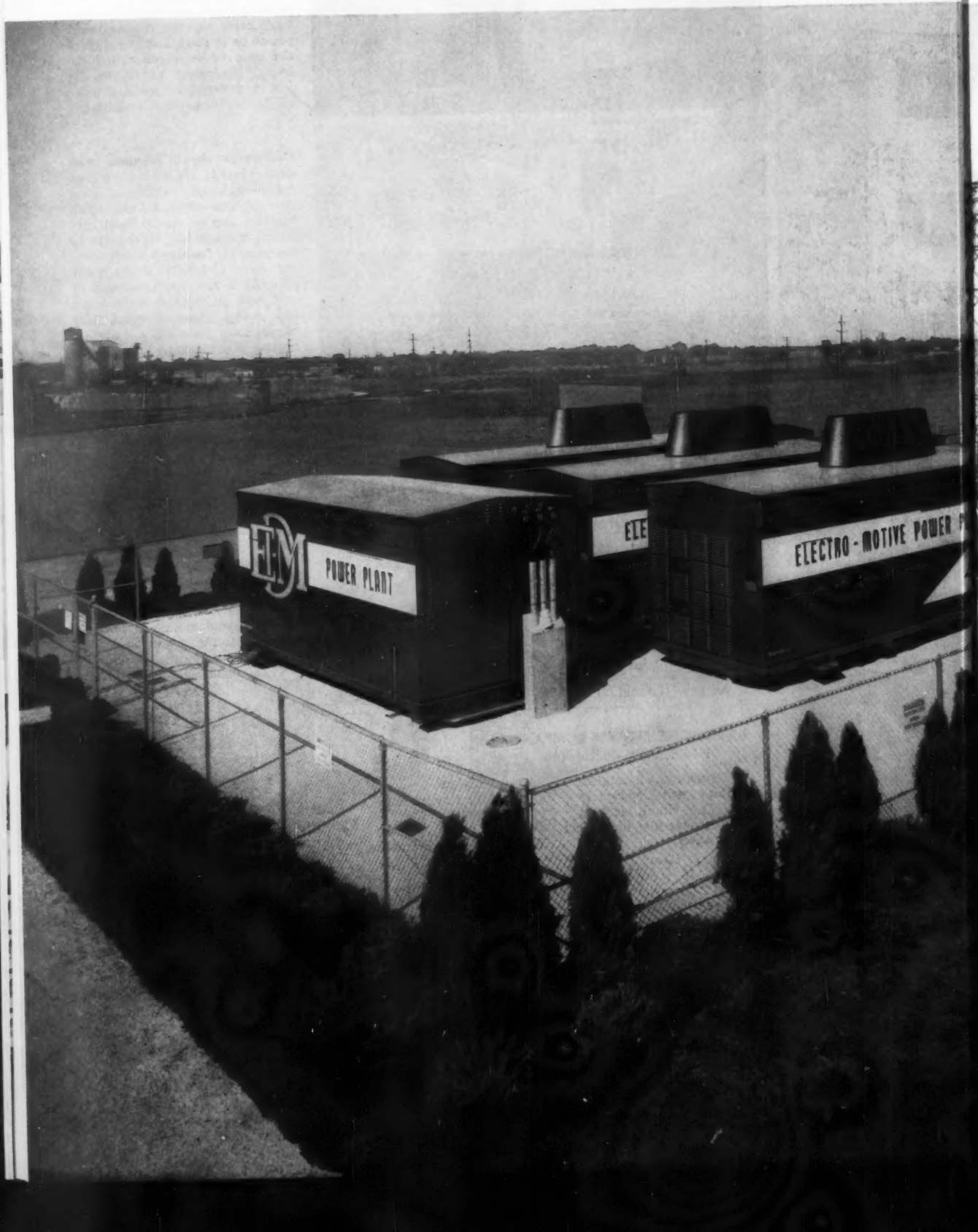
Name . . . . . Title . . . . .
Company . . . . .
Street . . . . .
City . . . . . Zone . . . State . . . . .

SEND COUPON OR WRITE

Get complete, up-to-date information on I-T-E equipment.

I-T-E CIRCUIT BREAKER COMPANY

PUSH BUTTON PEAKING –



—ANYWHERE, ANYTIME

Completely unattended, 6000 KW Electro-Motive Plant is on the line at full power in ninety seconds or less

A signal from a central dispatching point brings Electro-Motive Peaking Power on the line where it's needed—near the load. Within 90 seconds from the push of a button, you can satisfy peaking or spinning reserve requirements. It starts, synchronizes, goes on the line, and steps up to full power output *completely unattended.* No warm up period is needed, no prior preparation is required.

The Electro-Motive Peaking Plant is an *outdoor,* sound-deadened, weather-proofed plant ready for easy installation anywhere on the system—right at the step-down substation serving the load. No expensive building or foundation work is required.

Unitized, self-contained design allows:

- **low investment cost..$85 per KW, f.o.b. factory**
- **low installation costs..less than $15 per KW**
- **flexibility in meeting site limitations**
- **adjustment in capacity at very low incremental cost**

An Electro-Motive 6000 KW Peaking Plant can be operating on your system in less than 5 months time—4 months lead time plus 10 days for installation.

For complete details, see your Electro-Motive representative.

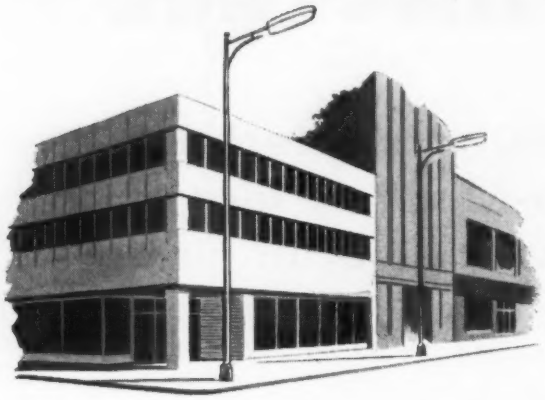
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS • LA GRANGE, ILLINOIS

Sales-engineering offices: Chicago, New York, St. Louis, San Francisco

In Canada: General Motors Diesel Limited, London, Ontario

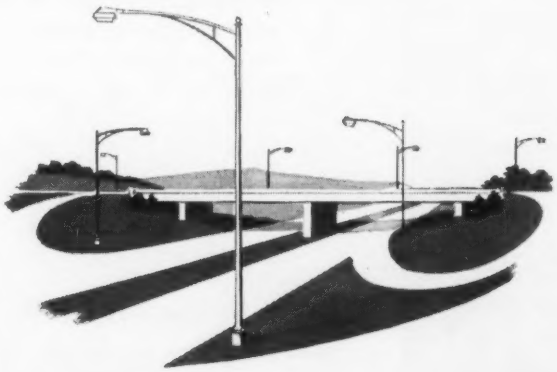
for street lighting • highway lighting • floodlighting

UNION METAL MONOTUBE POLES



Monotube street lighting poles . . . steel or aluminum . . . round or fluted . . . davit or bracket styling . . . anchor or transformer base. Attractive in any location. Continuous-tapered Monotube poles are available in a broad range of designs and sizes to meet all requirements.

Monotube highway lighting poles are offered for various mounting heights and strength requirements. Easily wired and installed. Steel Monotubes are made from high grade, open hearth steel and cold-rolled for strength. Aluminum poles are made by the spinning method.



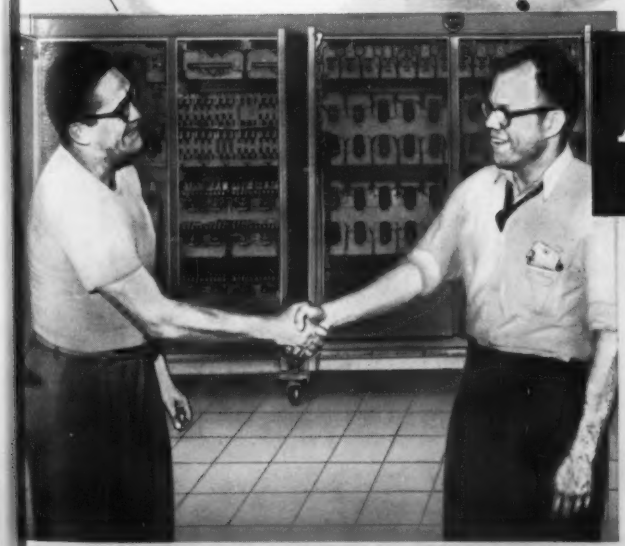
Monotube floodlighting poles . . . for sports, business, industrial or recreational areas. Available in heights from 20 to 100 feet. Monotube designs permit extreme flexibility in arrangement and number of light units per pole. Floodlights can be mounted, positioned and wired while pole is on the ground.

THE **UNION METAL** MANUFACTURING COMPANY

CANTON 5, OHIO — BRAMPTON, ONTARIO, CANADA

Monotube Lighting Poles

Precision Guidance of Nearly a Mile of Plate Glass...



A series of control panels such as this is used in the Pittsburgh Plate Glass cutting room. Above are shown the Allen-Bradley engineers after completing the factory testing of the final panel.

controls by ALLEN-BRADLEY of course!

The New Pittsburgh Plate Glass Plant at Cumberland, Maryland, heralds a new era in the art of plate glass making. Night and day, a continuous ribbon of glass is fed to a nearly mile-long process line. Then a complex control system directs the automatic cutting, sorting, and conveying of the glass to six areas, according to a continuously varying program.

Special control panels which integrate portions of this equipment into a unified, smoothly operating system were designed, developed, and engineered by Allen-Bradley. You can benefit by this extensive control experience . . . it is a "plus" value when you specify Allen-Bradley *quality* motor control.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

See on the next page how A-B Controls do it... →

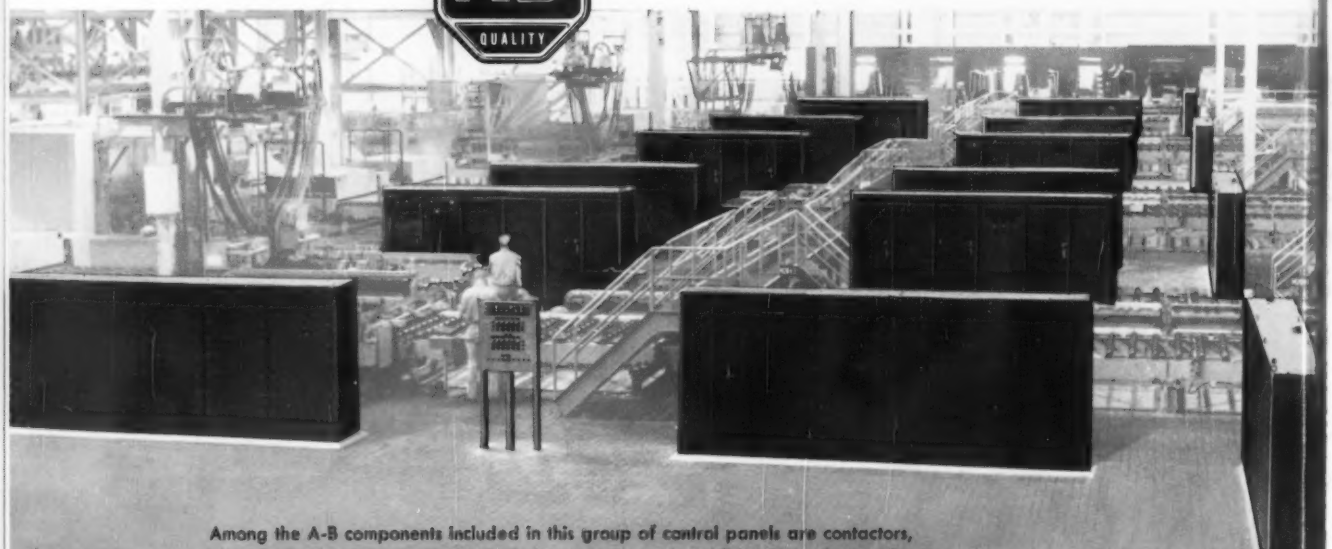
5-59-MR

Plate Glass made by the mile

with reliable ALLEN-BRADLEY Controls

A-B QUALITY

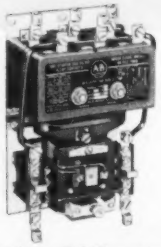
In the cutting room at Pittsburgh Plate Glass (below), Allen-Bradley controls prove the reliability of their "simple design." All A-B solenoid starters, contactors, and relays have only ONE moving part . . . assuring *millions* of trouble free operations. There are *no* bearings or jumpers to cause trouble. Contact maintenance is also eliminated — A-B double break, silver alloy contacts remain in perfect operating condition until completely worn away. Insist on Allen-Bradley *quality* motor controls . . . you cannot do better!



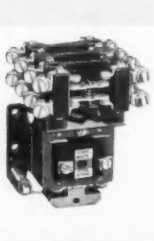
Among the A-B components included in this group of control panels are contactors, control relays, pneumatic timers, and electronic timers. In addition, there is a series of oiltight push button units and oiltight limit switches used in the cutting room.

Some of the standard components which are used in this plant

Contactor—Bulletin 702, Size 3 shown. Made up to Size 8, rated 1350 amps, 220-550 v.

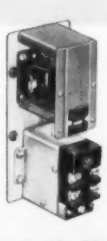


Solenoid Starter Bulletin 709, Size 2 shown. Made in ratings to 450 hp, 220v; 900 hp, 440-550 v.



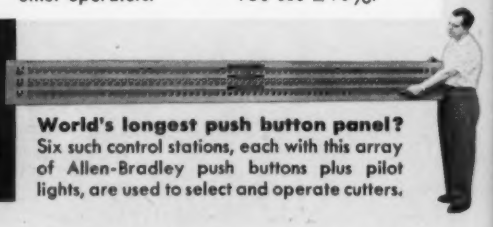
Control Relay—Bulletin 700. Universal type relay with both N.O. and N.C. contacts shown.

Limit Switch—Bulletin 802T. Oiltight roller lever type shown. Also with many other operators.



Pneumatic Timer Bulletin 849 for on-delay or off-delay. Range from 1/20 to 180 sec ±10%.

ALLEN-BRADLEY
Quality Motor Control



World's longest push button panel? Six such control stations, each with this array of Allen-Bradley push buttons plus pilot lights, are used to select and operate cutters.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

5-59-MR

The Microwave Radio System *that Grows... as you Grow!*

RCA Microwave Radio Systems are designed with future needs in mind. They do not face obsolescence because of users' growth. High channel capacity permits orderly growth up to a total of 120 channels for voice, data transmission, supervisory control and other purposes.

RCA was one of the earliest pioneers in the development of microwave for commercial communications. Today, RCA Microwave Systems provide users throughout the world with many important features . . . operation in the most advantageous frequency bands, simplified installation and minimum maintenance cost.

Serving their users with dependability and precision, RCA Microwave Systems are now operated by utilities, gas and petroleum pipelines, cross country turnpikes, and government agencies.

More than a million channel miles of RCA Microwave Systems in service . . . performance proved throughout the world.

RCA Microwave specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars.

SPECIAL NOTE TO RCA CUSTOMERS:

Ask about the RCA "Package Expansion Plan" which confirms your wise choice of RCA CW-20 or MM-26 Microwave for your communications system. A minor field modification will bring your system up to 48, 96 or even 120 channel capacity, depending on your revised requirements.

Radio Corporation of America
Communications Products
Dept. SD-45, Building 15-1, Camden, N. J.

☐ Tell me more about RCA "Package Expansion Plan." We have RCA_____Microwave.

☐ Send latest literature on RCA Microwave Radio for use in _____

NAME _____ TITLE _____
(PLEASE PRINT)

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ COUNTY _____ STATE _____

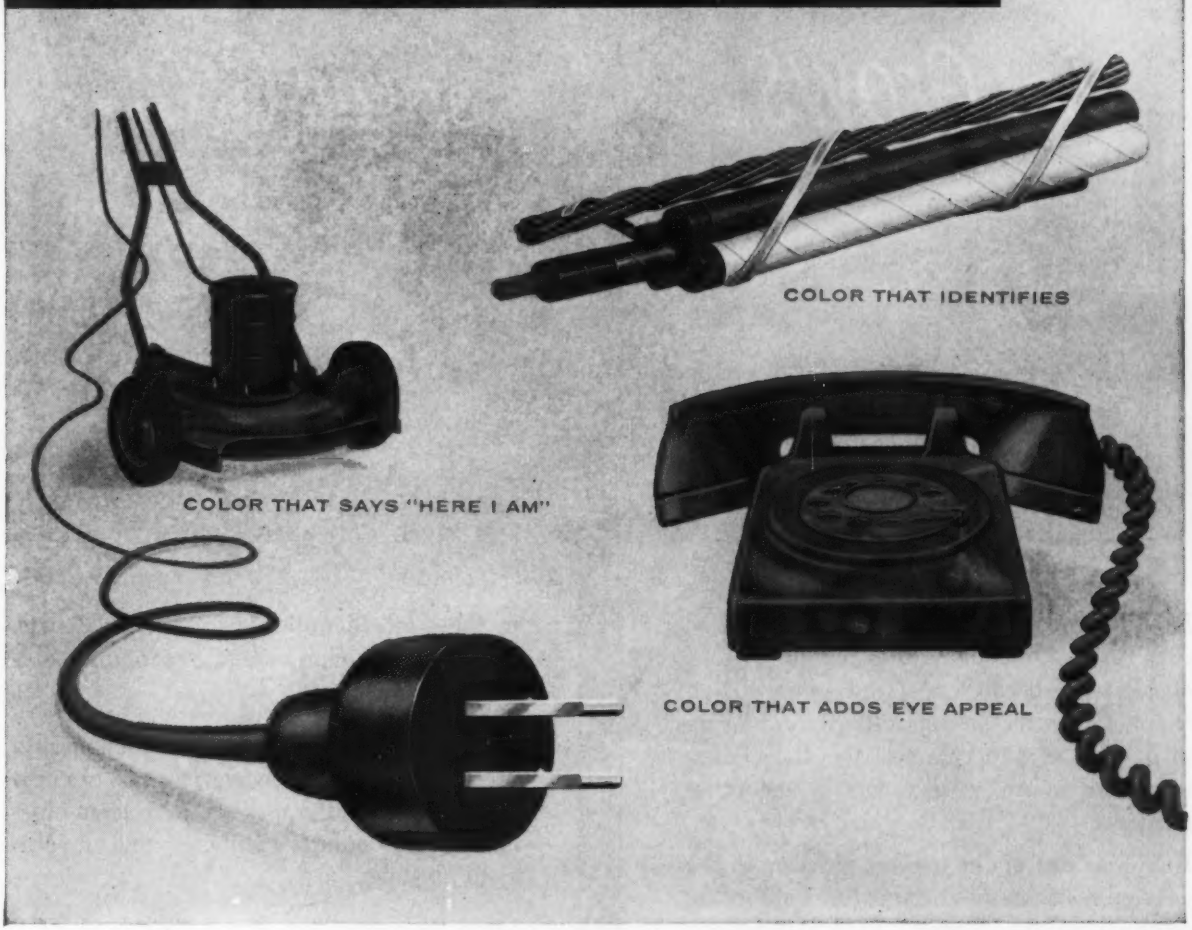
☐ Have representative contact me.

RCA Tmk(s) ®

RADIO CORPORATION of AMERICA
COMMUNICATIONS PRODUCTS
Camden, N. J.

Naugatuck PARACRIL OZO

The oil-resistant, ozone-resistant nitrile rubber



Now! lasting **COLORS** in rubber wire jackets

A development of Naugatuck research makes it possible to combine in a vulcanized rubber wire jacket all these properties:

- Excellent resistance to ozone and outdoor "weathering"
- Outstanding heat resistance
- High abrasion resistance
- Excellent oil, grease and chemical resistance
- Fast CV extrusion

...PLUS PERMANENT BRIGHT COLORS

In addition to the suggested uses, you will think of dozens of other applications where wire jacketing with all these properties can serve either an aesthetic or utilitarian purpose.

One of Naugatuck's technical representatives will be happy to discuss with any prospective user the formulation of the Paracril® Ozo compound which makes possible this combination of properties... not only in wire jacketing but also in shoe soles, hose jackets, weather stripping and other vulcanized rubber products.

Naugatuck Chemical

Division of United States Rubber Company

413P Elm Street
Naugatuck, Connecticut

US RUBBER

Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario • CABLE: Rubexport, N. Y.

FOR ACSR SPLICING...

NICOPRESS SINGLE SLEEVES

100% STRENGTH

- ★ **No separate steel core sleeves**
- ★ **No cut-back of aluminum strands**
- ★ **Self-contained inhibitor**
- ★ **Compress with present Nicopress No. 51 Tools**
- ★ **Faster and easier to splice *right***

Linemen can make 100%-rated-strength splices in ACSR faster and easier every time with the Nicopress Single Splicing Sleeve. Conductor is readily slipped into the sleeve, which is then compressed. Time-consuming cut-back of aluminum strands, application of steel core sleeves, messy application of separate inhibitor, are all eliminated.

Compress the sleeve with your present Nicopress 51 ACSR Tools (outer groove in jaw) and a uniformly-centered splice with 100%-rated-strength of the ACSR is made.

Nicopress Single ACSR Sleeves are available for sizes 4-6/1, 4-7/1, 2-6/1, 2-7/1, and 1/0-6/1.

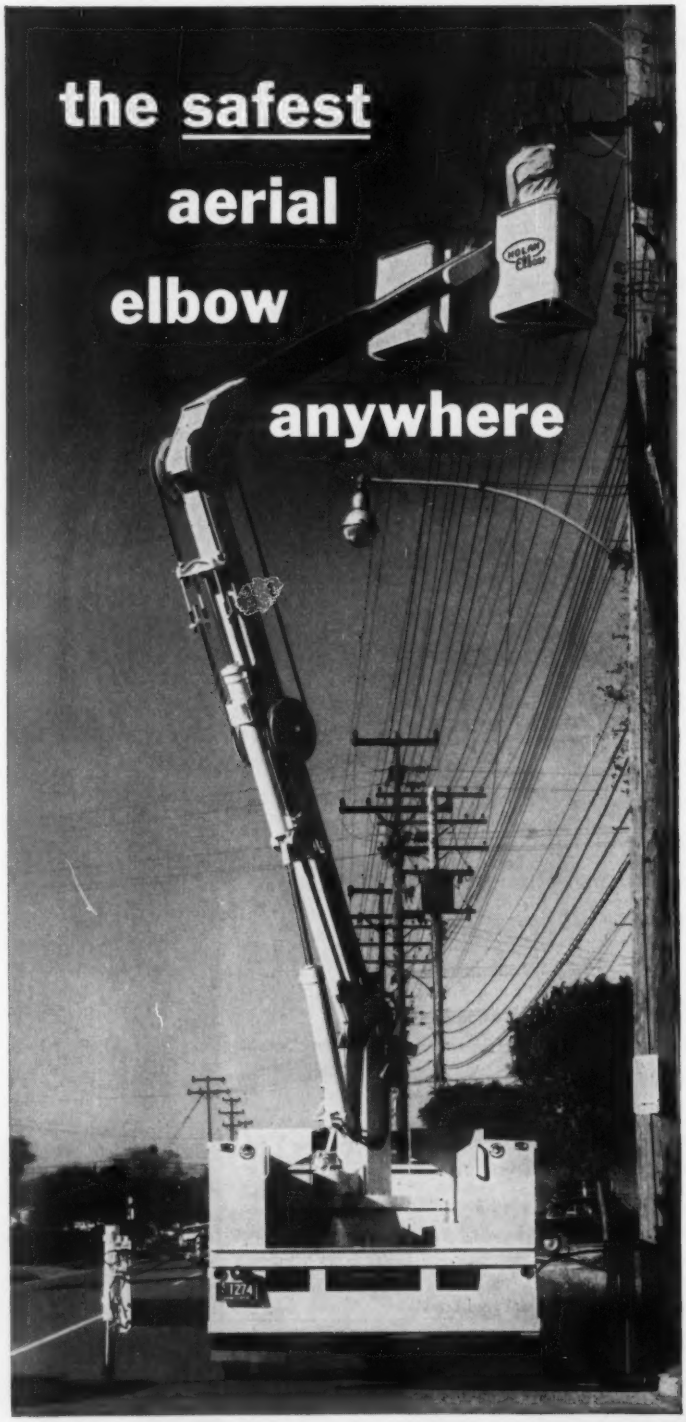
The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

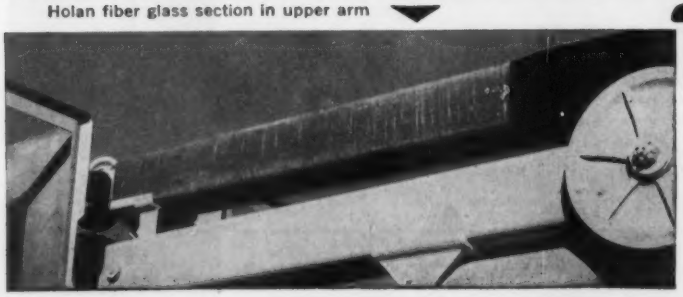
Canadian Mfr.—H. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Nicopress is the Registered Trade Mark of The National Telephone Supply Company



Holan fiber glass section in upper arm



Holan Elbow has precise aircraft-type cable controls and strong, non-conductive fiber glass section in upper arm

With a Holan Elbow, it's easy to get to the problem—and safe when you get there.

The exclusive cable control system provides easy, precise spotting of the buckets. And a fiber glass section in the upper arm insulates workmen in the buckets from the ground.

The fiber glass section is solid—*not* metal enclosed with fiber glass. Also, control cables and leveling cables have fiber glass inserts so that men in the bucket are completely separated from metal-to-ground contact. In a bucket-to-ground test, the non-conductive fiber glass section withstood 100,000 volts for one minute.

As for strength, in a separate test the fiber glass section required a 6,200-pound load at end before failing. This is a safety factor in excess of 7 as nominal capacity and weight of the buckets total 800 pounds.

Safety does come first but there are many operating features to talk about, too. Write for all the details.

Holan Corporation, 4100 W. 150th St., Cleveland 35, Ohio
Plants in: Cleveland, Ohio; Griffin, Georgia; Phoenix, Ariz.

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN

ANDERSON ELECTRIC

Anderson Electric's exclusive Vers-a-groove T-Connectors feature 3-piece design for easy installation . . . 8-bolt construction for controlled clamping pressures and greater contact length . . . reversible clamp for increased cable range and wider application.

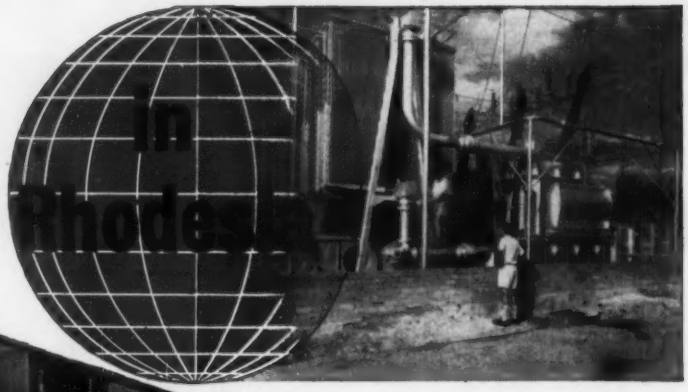
ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

Aluminum & Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATIONS • TRANSMISSION • DISTRIBUTION • UNDERGROUND

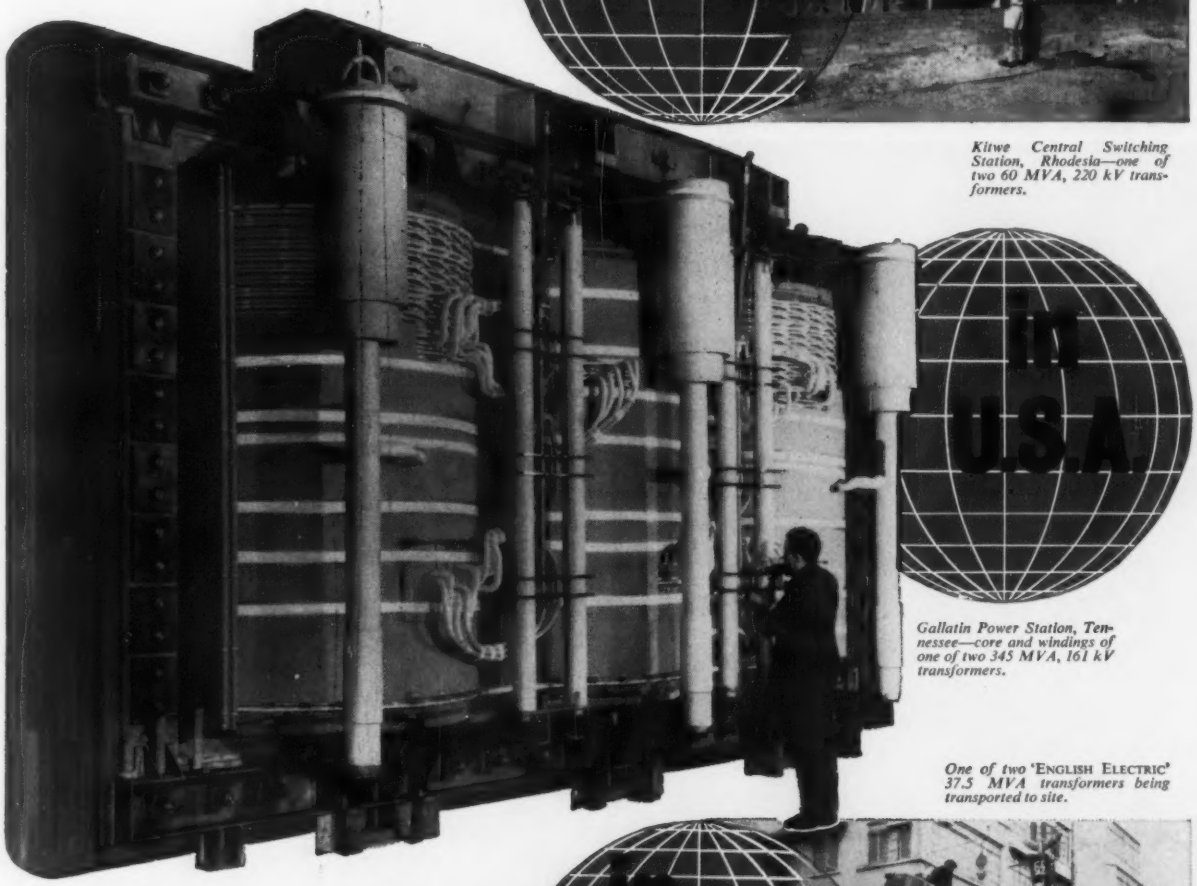
TTCB SERIES

versatile...

Transforming the WORLD'S POWER

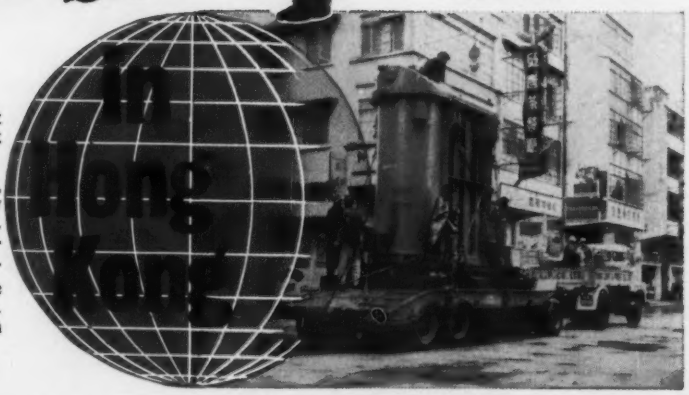


Kitwe Central Switching Station, Rhodesia—one of two 60 MVA, 220 kV transformers.



Gallatin Power Station, Tennessee—core and windings of one of two 345 MVA, 161 kV transformers.

One of two 'ENGLISH ELECTRIC' *37.5 MVA transformers being transported to site.*



'ENGLISH ELECTRIC' transformers are in service throughout the world and can be supplied for voltages up to the highest envisaged and for outputs up to the largest practicable.

Two of the largest transformers in the world—345 MVA, 22.5/161 kV, 3-phase, 60 cycles—have been supplied by 'ENGLISH ELECTRIC' to a T.V.A. power station in Tennessee. Contracts have been completed and are in course of manufacture for many other major American power projects.

'ENGLISH ELECTRIC' products cover all aspects of the generation, transmission and utilization of electric power. Service facilities are available through three large Canadian plants.

'ENGLISH ELECTRIC'

Agents for Washington, Oregon, Montana, Idaho, Wyoming, Nebraska, California, Arizona, Utah, Nevada and Alaska: **James I. Metcalf & Co., Inc.,** 701 United Pacific Building, Seattle 4, Washington. Branch offices in San Francisco, Los Angeles, Portland, Phoenix. Agents for Georgia, Alabama, Tennessee, South Carolina, Florida and Kentucky: **Osgood & Associates, Inc.,** 988 Spring St. N.W., P.O. Box 7383, Station C, Atlanta 9, Ga. Agents for Louisiana and Mississippi: **Electron Equipment Co., Inc.,** 1050 Constance St., New Orleans 13, La. Agents for Texas, Oklahoma, Arkansas and New Mexico: **Peabody Bros.,** 2903 St. Louis St. at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa.

Enquiries for territories not covered by Agents should be directed to:

ENGLISH ELECTRIC EXPORT & TRADING CO., LTD., 750 Third Avenue, New York 17, N. Y. Telephone: Murray Hill 7-0303

OC/US/I

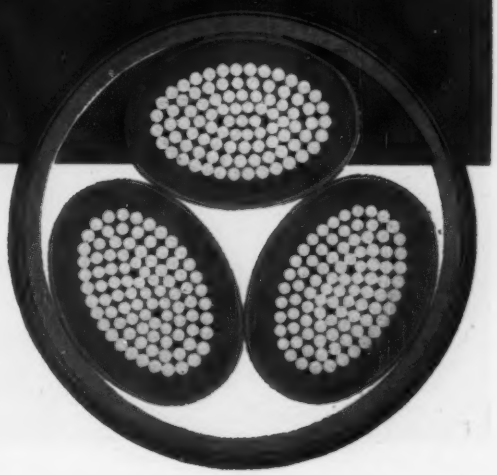
experience

keeps BICC *in the lead*

134 countries can't be wrong —

Last year the BICC Group traded in 134 countries. We supplied cables, conductors and accessories for every electrical purpose, and sales amounted to $310,800,000. Why such a demand? Well, we're not only the World's biggest cablemakers; we're the most experienced too. Here are some of our recent developments.

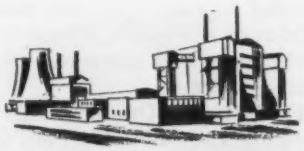
The DSO cable



The Ductless Shaped-conductor Oil-filled cable is BICC's latest development in 33kV transmission. Dispensing with fillers and built-in ducts, the design means economy in materials and manufacture. Consequently, costs are lower. The advantages of D.S.O. Cables were quickly recognised. They have already been ordered for a number of installations in Britain and South Africa.

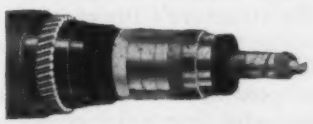
CABLES FOR THE FIRST NUCLEAR POWER STATION

BICC supplied cables and accessories for Calder Hall, England, the first nuclear power station in commercial operation. The cables included specially designed types resistant to intense radiation and heat, for operating the fuel charging and discharging grabs.



VANCOUVER POWER LINK

The 138kV Submarine Power Link between the British Columbia mainland and Vancouver Island required seven unjointed cables each 16 miles in length: the longest unjointed power cables ever! Although this project was considered to be impossible by the electrical world, BICC designed, made and laid the cables with conspicuous success. Altogether, $10 million worth of power cable contracts have been placed with BICC by the British Columbia Electric Co., Ltd.



330,000 VOLT CABLE FOR KARIBA

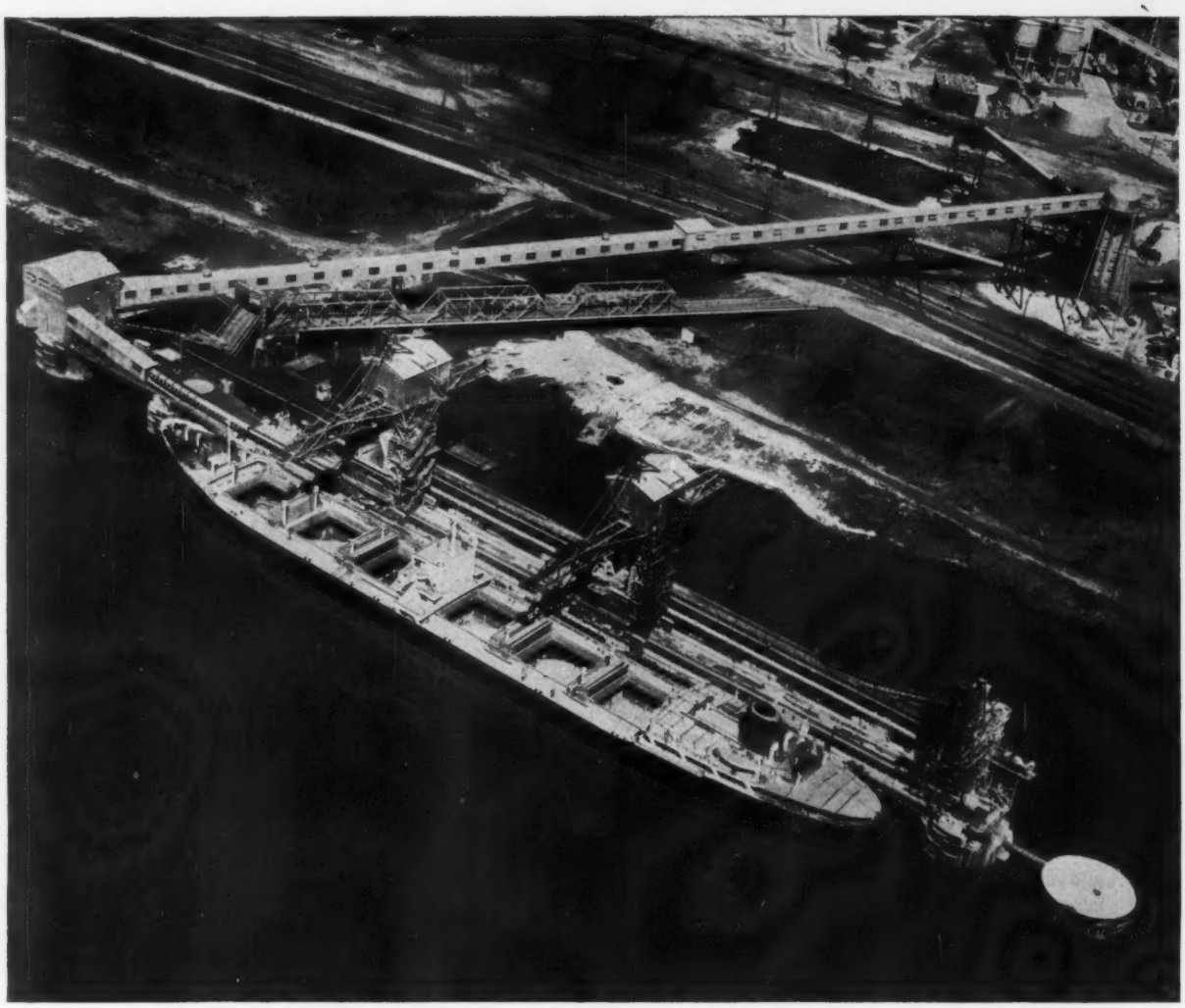
The Kariba Dam is being built on the Zambesi River to provide hydro-electric power for Central Africa.

Transmission equipment for this project is being manufactured by BICC. Altogether, orders for this Company total some ten million dollars and include a specially designed 330,000 volt single-conductor oil-filled cable—at present being manufactured — which will connect the underground power house to the overhead transmission lines. This will be the highest voltage cable ever installed in Africa.

BICC the World's largest cablemakers

BRITISH INSULATED CALLENDER'S CABLES LIMITED

Technical Representative in U.S.A., Arthur F. Coventry, 11 West 42nd Street, Suite 442, New York 36, N.Y.



a new concept in ship unloaders!

Dravo completes new type rope-operated man-trolley unloaders at Burnside, La.

A new type ship unloader was designed and built by Dravo for the Greater Baton Rouge Port Commission's bulk marine terminal on the Mississippi River at Burnside, La. Two of these machines operate on an 858-foot Dravo-built dock.

The new public terminal, operated by Ramsay, Scarlett & Co., Inc., is the largest facility for handling bulk cargo in the Gulf Coast area.

An entirely new concept in traveling ship unloaders, this unique, rope-operated, man-trolley design combines advantages of the conventional man-trolley unloader with the light-weight construction of rope-operated machines. The result is a highly efficient unit that reduces ship turn-around time to a minimum never before obtainable with a rope-operated unloader of comparable size.

All hoisting machinery is located in the structure's tower, greatly reducing the weight of the man-trolley. The bucket, which has a hoist speed of 540 feet per minute, is suspended from a ring-type turntable and can be rotated for more efficient digging under decks. Operators have an unobstructed view into either barges or ships' holds. The man-trolley can be racked back and forth along a 149-foot runway at 540 feet per minute.

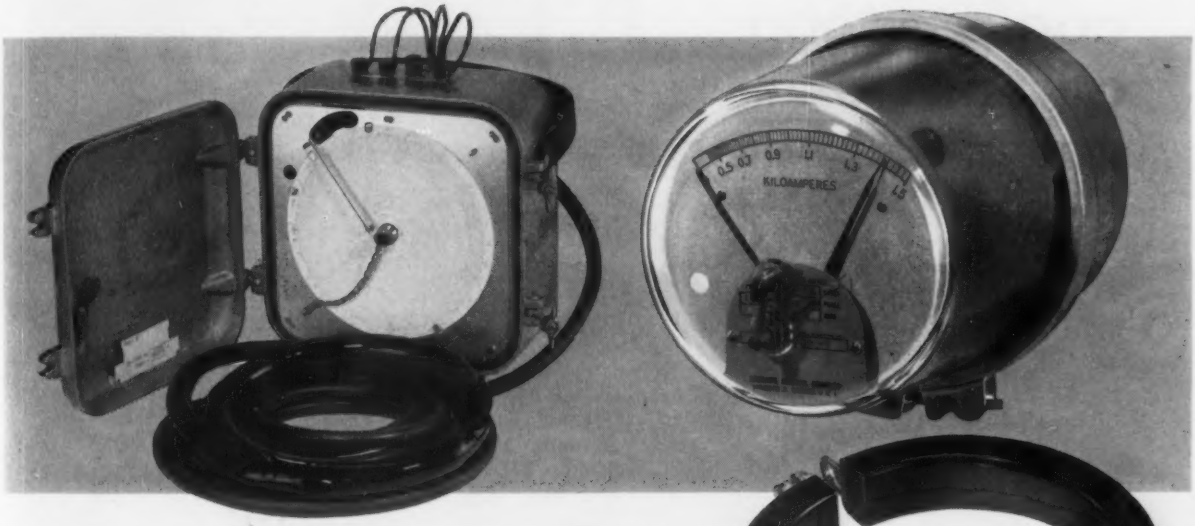
The reeving system (patents applied for) of the new unloaders greatly reduces down time for bucket changing and rope replacement. Substantial savings are realized in rope costs, too, since a minimum of rope is wasted when replacing sections damaged by ships' hatch coamings.

Find out how Dravo's design and building know-how can help solve your bulk materials handling problems. Simply call us at Pittsburgh, Spalding 1-1200, or write to DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

DRAVO
CORPORATION

DEVELOPED TO MEET YOUR NEEDS:

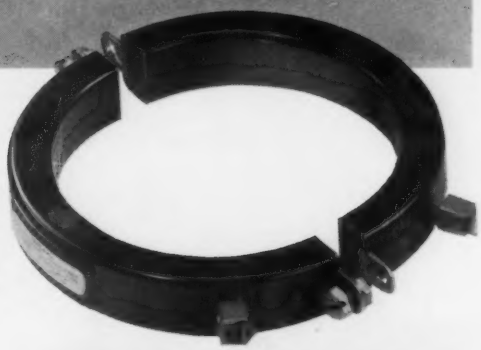
New Lincoln Meters
FOR SYSTEM MEASUREMENT



For simple low-cost network system load measurement

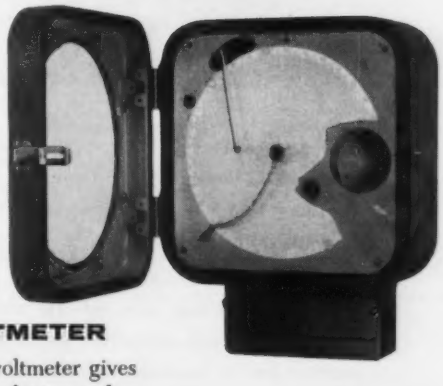
Developed for survey information on underground networks, new split-core transformers and a submersible Lincoln graphic ammeter provide unusual flexibility.

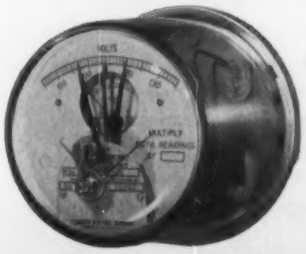
Indicating ammeter can be permanently mounted outside vault using new split-core transformers located on network protector bushings.



SYNCHRONOUS-CARRYOVER GRAPHIC METER

Sangamo designed this graphic meter to keep the chart turning during power interruptions. The carryover-drive mechanism maintains timing for outages up to 14 hours and also provides a record of the number and time of outages.





LINCOLN INDICATING VOLTMETER

A newly designed model of the Lincoln voltmeter gives "steady state" maximum and minimum voltages and instantaneous readings for immediate indication as to whether the circuit is energized.

SM59-1

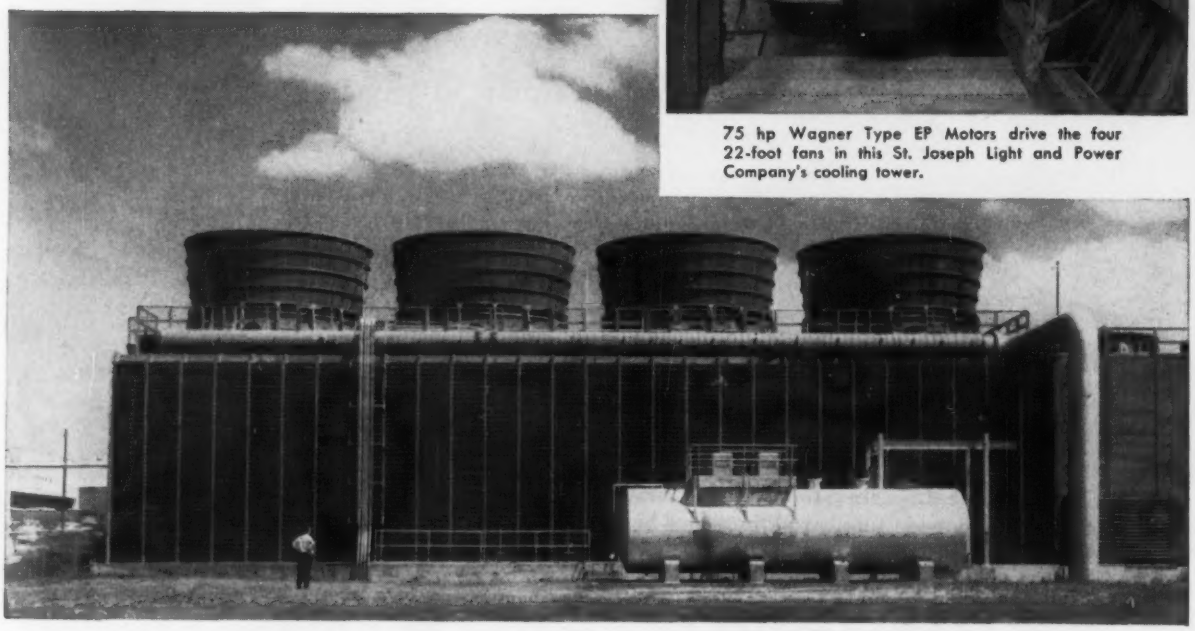
SANGAMO Electric Company
SPRINGFIELD, ILLINOIS

Wagner

ELECTRIC MOTORS . . . THE CHOICE OF LEADERS IN INDUSTRY

St. Joseph Tower for Power COOLS 28,000 GALLONS OF WATER PER MINUTE

75 hp Wagner Type EP Motors drive the four 22-foot fans in this St. Joseph Light and Power Company's cooling tower.



This Marley Double-Flow 4-cell cooling tower, at St. Joseph Light and Power Company, cools water at the rate of 28,000 gallons per minute to get more kilowatts from steam.

Driving 22-foot cooling tower fans is a job for rugged motors—motors that must operate without attention month after month, completely exposed to all kinds of weather and to constant high humidity, the number one cause of motor failure in cooling tower applications.

The Wagner Type EP Motors used on this tower meet these requirements. All vital parts are totally-enclosed for extra protection against fumes, dust and moisture . . . and the frames, endplates and conduit box are made of heavy cast iron for extra protection against high humidity and corrosion.

These versatile standard motors can meet your requirements for motor drives that must operate under adverse conditions. They are available in ratings through 500 hp. Call your nearby Wagner field engineer, or write for Bulletin MU-224 (Covers standard and explosion-proof totally-enclosed fan-cooled motors).

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

WH59-5

6456 PLYMOUTH AVENUE, ST. LOUIS 14, MISSOURI

SERVING 2 GREAT GROWTH INDUSTRIES . . . *ELECTRICAL . . . AUTOMOTIVE*

public utility men prefer—

YORK-HOOVER
YMR-76 Service Bodies

MODERN

PROVEN

EFFICIENT

"Custom" features such as material drawers with adjustable compartments are available as standard or optional equipment, as required.

LESS SERVICE HOURS...

plus extra savings in operators time are the results obtained by hundreds of YMR-76 Service Bodies in operation today. That's because YMR-76 units are compact and rugged . . . provide ample and convenient carrying space for materials and tools . . . with capacity for adjustment to meet changing conditions. Write for complete details, price, and delivery information today!

CLIP AND MAIL TODAY!

Dept. 1E, York-Hoover Corporation
York, Penna.

Please send me a copy of Bulletin No. 942 covering your YMR-76 Service Body.

Name_____

Company_____

Address_____

City and State_____

BODY DIVISION
YORK-HOOVER CORPORATION
YORK, PENNSYLVANIA

CREATIVE ENGINEERING FOR THE PUBLIC UTILITY INDUSTRY SINCE 1892

Here are answers to some of about **KPF** switches

Q. *How can KPF switch blades maintain positive contact with switch clip under changing line sag conditions?*

A. Two heavy copper clips, bolted to a shoe carrying the flexible jumper, are mounted inside a special "horseshoe shaped" casting by two toggle bolts. These toggle bolts pass freely through the outer leaves of the clips, and the entire contact assembly "floats" on these bolts. Half-spherical bolt heads and adjusting nuts permit movement in any direction. The tension of the clip leaves on the blade is sufficient to insure positive alignment, since either clip or blade can follow the other to conform to line sag changes.

Q. *How can insulator stacks follow normal line sag changes?*

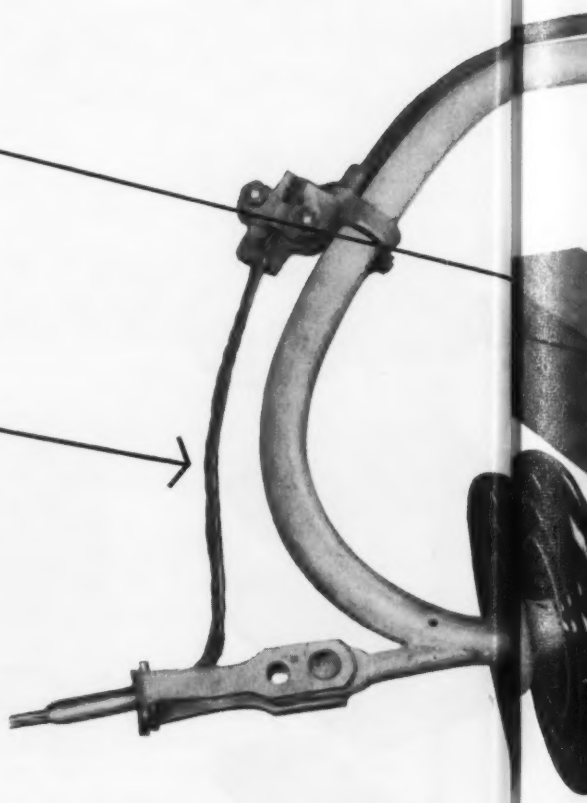
A. The insulator stack bearing units may be likened to limited universal joints. The actual bearing, a monel pin in an everdur trunnion, allows 90° movement of the rotating arm of the phase unit, as well as approximately 7° vertical movement to follow line sag. It is impossible for the bearing to bind under normal line stress, and insulator stacks always follow the sag of the conductor.

Q. *How are conductors connected to KPF switches?*

A. With KPF Type A switches, the user eliminates dead-end insulators. Any standard strain clamp can be used, and hot lines may be dead-ended directly to the phase units. Switch arms and dead-end eyes are integral with the insulator assembly. The conductor is lead through the strain clamp and on to a copper terminal on the switch arm. Aluminum conductors may be connected to the switch arm through special KPF terminals designed for this service. Type A switches may be mounted on a separate crossarm with conductors deadened below or above (for angle-pole installations, etc.). Switch operates equally well with or without line tension.

Q. *For what voltages are KPF air break switches available?*

A. KPF Type A and S standard "line-tension" switches are available for common voltages from 7.5 to 110 KV. Special switches combining a disconnect with a fuseholder (Type UF, double-cross-arm mounting) and for use where line tension is not present are also offered in these same voltage ranges. Ground switches are available for Type A or S switches. Type R switches are offered for use where line tension is not present or it is desired to use a specific type of apparatus insulator.



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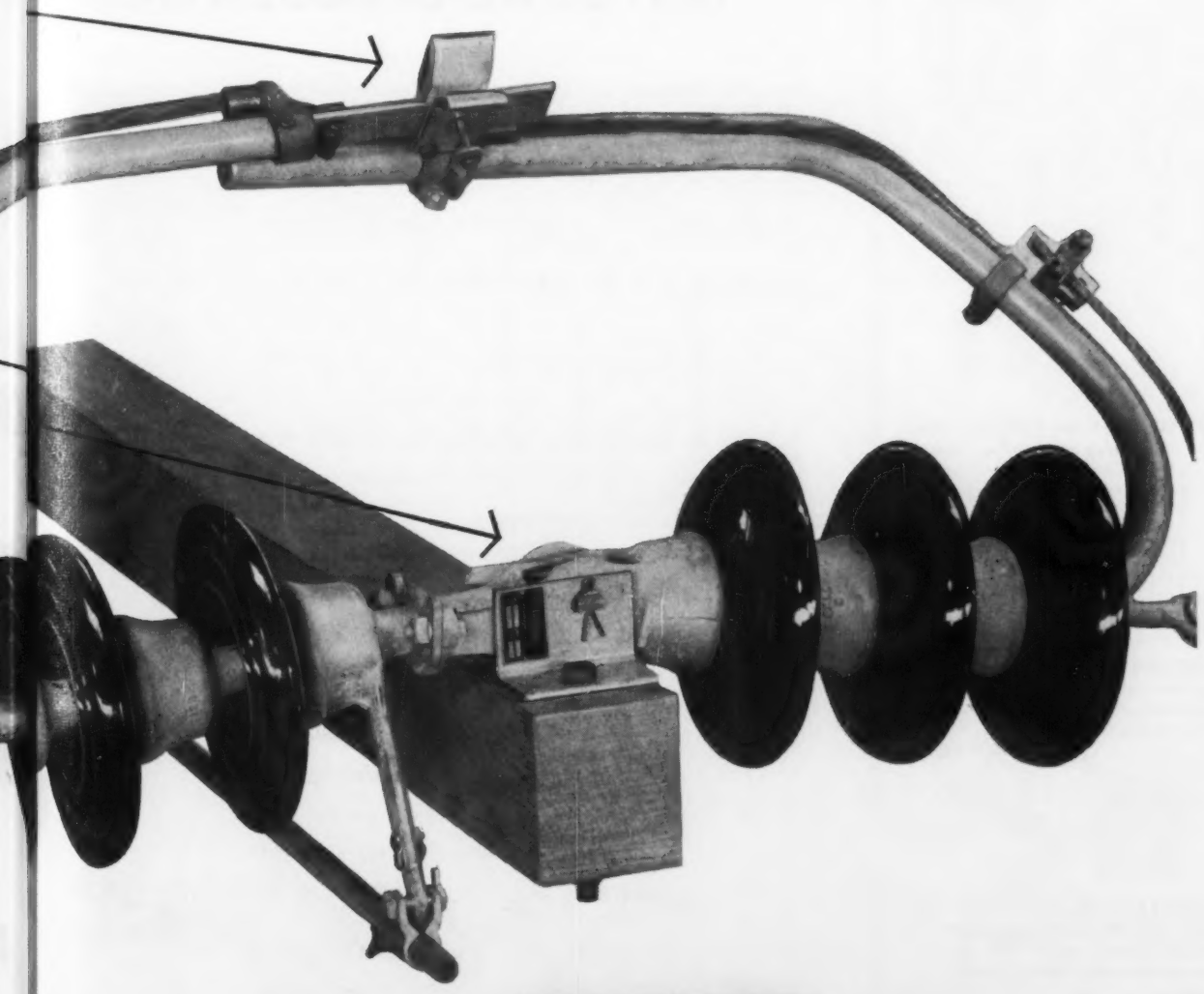
often-asked questions



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Power Plant Products

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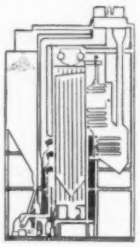

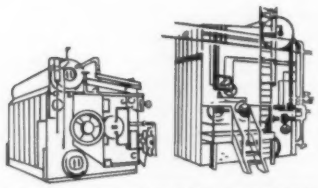

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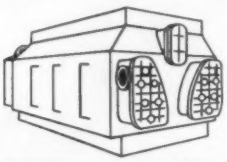

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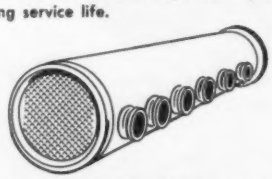

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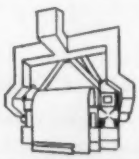

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WORLD'S FIRST

NATURAL CIRCULATION

321,500 kw Unit No. 3 at Detroit Edison's River Rouge Power Plant is served by a Foster Wheeler Reheat Steam Generator —one of the most efficient ever built

One of the largest steam generators ever built, this unit was heat engineered by Foster Wheeler to meet the most exacting plant requirements. It supplies Detroit Edison's River Rouge Unit #3 with *two million* pounds of steam per hour at 2450 psi and 1050 F at the superheater outlet. The steam is reheated to 1000 F after it has passed through the initial stages of the turbine.

Size alone is not the only measure of this installation. The FW steam generator also helps make Unit #3, with a heat rate of 8685 Btu per kwhr, one of the most economical and efficient ever built, producing a kilowatt hour of electricity from less than ¾ lb of coal.

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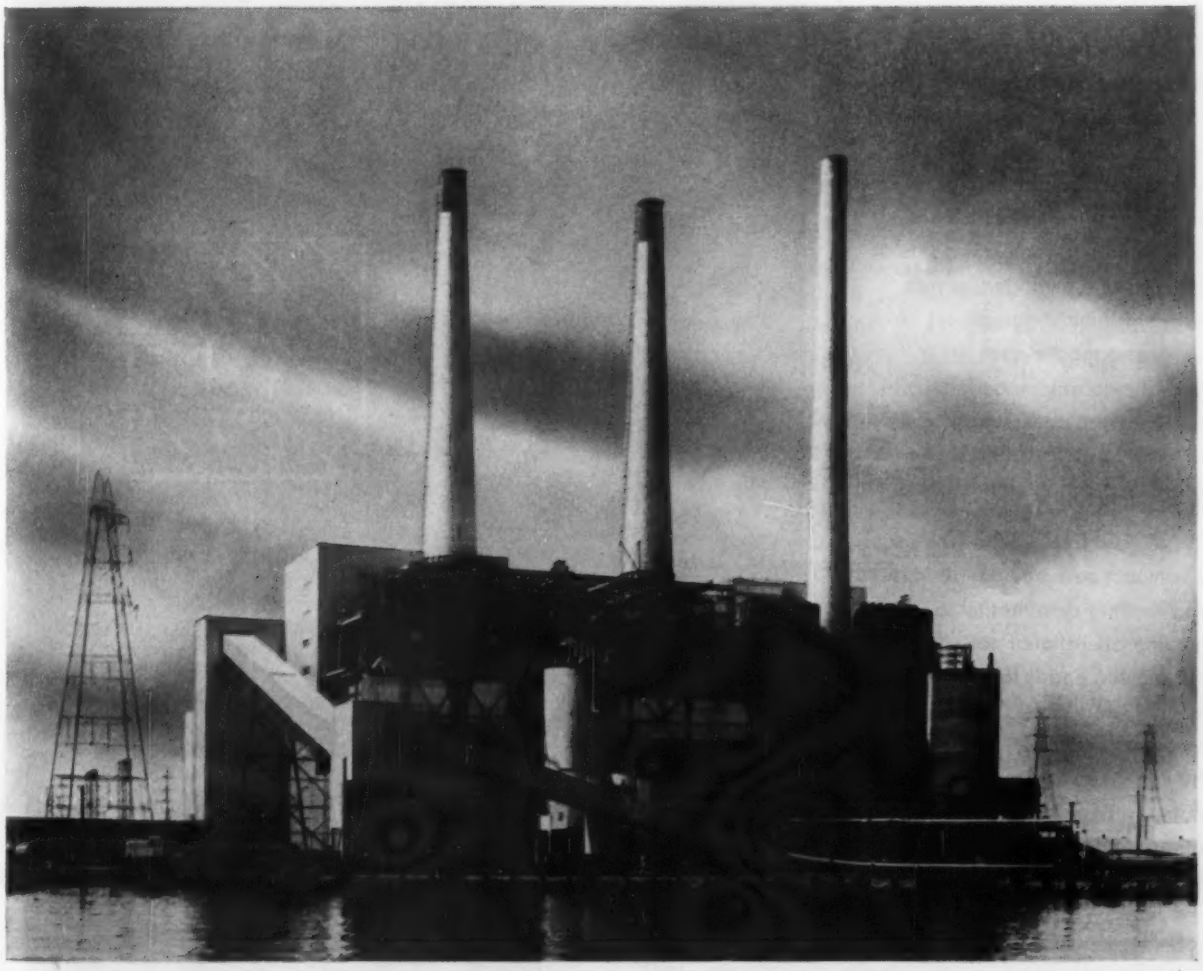

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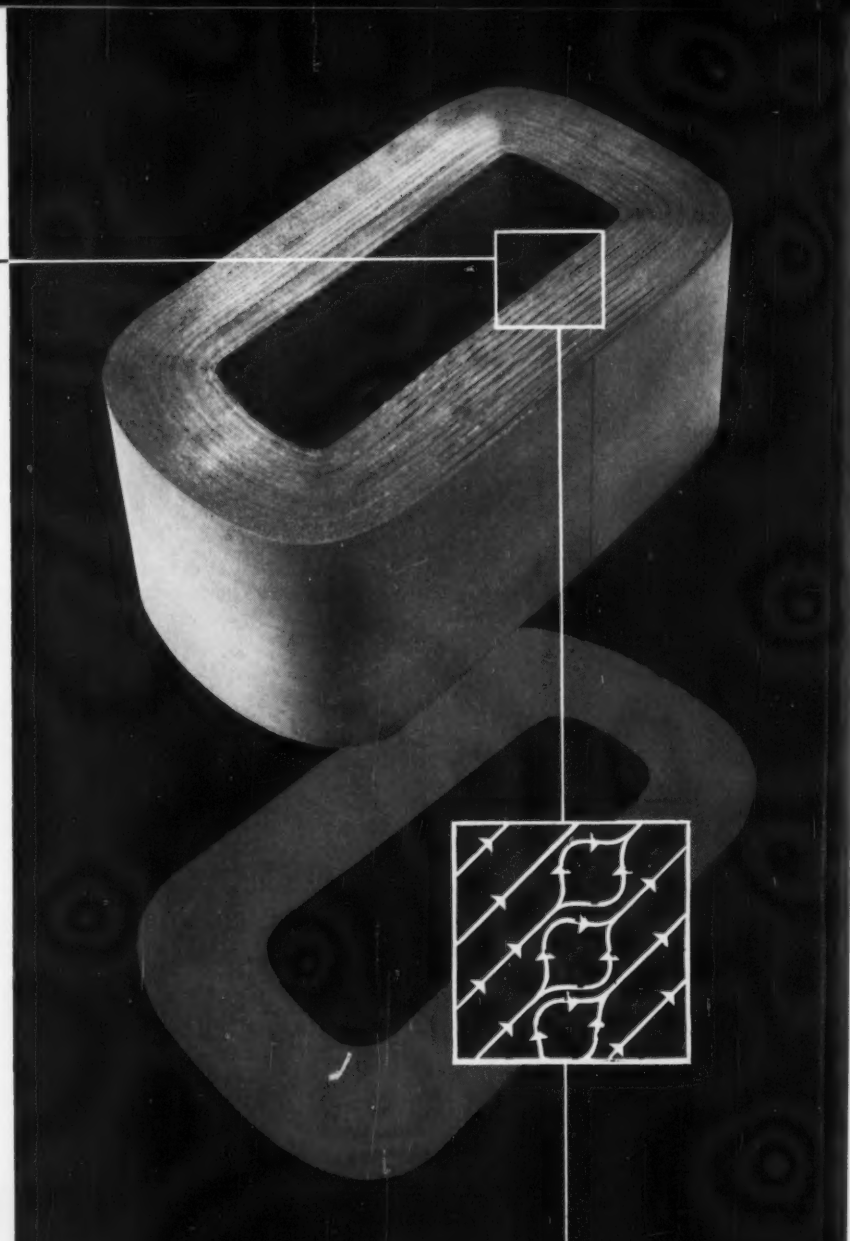

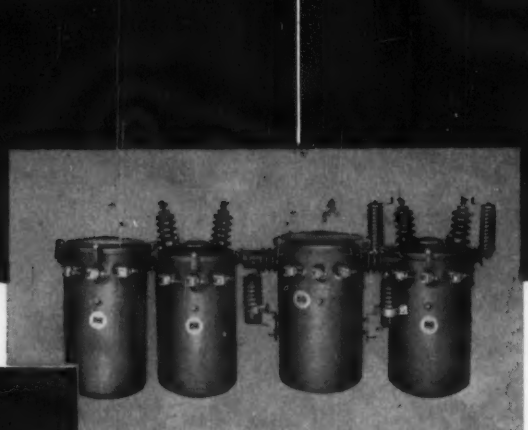

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FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Ideas that Could Work for You

The recent Edison Electric Institute convention (full report begins at page 83) could turn out to be the most rewarding meeting yet held by that group. The ultimate value of the meeting will depend in part on the ideas gained from the thoughtful program and the application of those ideas in the daily work of electric companies.

Certainly a number of appealing ideas were presented. Some had a new twist. Others were less new, but still sound. We have culled the papers and present a few of the more provocative ideas here:

POLITICS—Electric company executives should take a more active role in politics and encourage their employees to do the same. A U. S. Senator urged the EEI delegates to be more forceful in presenting their views to their representatives in Washington.

PUBLIC RELATIONS—The industry should strive to build an industry image as solid and appealing as the images of individual electric companies. To do this, another speaker suggested that utility executives stress the broad picture of overall industry accomplishments on every possible occasion. This same speaker also urged the industry to convince its customers that utilities are operated primarily in the interest of the customer, and said that the industry should give outspoken support to strong and independent regulatory agencies staffed by competent and well-paid personnel.

At least two speakers suggested that electric companies conduct economic education programs so that the American people will learn about and protect their free enterprise system.

Several ideas were advanced for enlisting women to help meet and solve utility public relations problems. One called for an EEI women's auxiliary—made up of wives of executives and leaders in the industry—to form a movement to clarify the issues facing utilities and gain utility allies among women in other organizations. Another idea was to elect more women to electric company boards of directors.

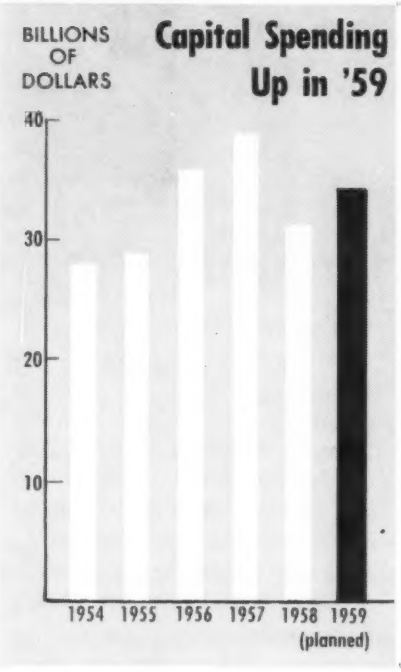
PERSONNEL—No effort should be spared in attracting keen and talented personnel to the industry. Ways must be found to explain the challenges offered and to kindle the imaginative sparks of young people coming into the industry so that they will keep the old-timers alert, growing, and changing for the better.

SALES—Climate control—with some special emphasis on humidity control—was seen as the most profitable and most promising of the relatively untapped markets for electric utilities. Sales promotion expenditures may have to be increased if the industry is to obtain maximum utilization of and satisfaction with its service.

SYSTEM PLANNING—Because of space limitations, greater use must be made of existing rights-of-way. There will be growing use of underground transmissions, and direct current conversion will come into play. Higher voltage secondaries are in the offing. For solid economy reasons, there will be continued and expanded cooperation between utilities and manufacturers in research on system equipment. Additional emphasis will be given to interconnections.

RATES—It was suggested that utilities explain higher bills in terms the customer can understand because customers' bills are going to increase dollarwise at a rapid rate as use of service continues to increase. Special attention should be given to high-use customers to keep them informed of the reasons for their higher bills and because often these are the opinion leaders in a community. Utility rate structures will have to recognize higher charges on higher fixed investment and, at the same time, be further simplified and made more promotional to permit the sale of service in volume. Utilities should advocate "fair value" as a basis for rate-making in order that inflationary effects can be partially offset.

Additional ideas, every bit as appealing as those above, are presented in our full convention report along with more details on the ones mentioned here. All of these ideas seek to further the sound objectives of electric companies. Some may help you meet the problems that face you today.



PLANS FOR CAPITAL SPENDING

(Millions of Dollars)

INDUSTRY	1958 Actual	1959 Planned	1958-1959 % Change	Preliminary Plans 1960	1961	1962
All Manufacturing	$9,761	$10,472	+ 7%	$10,448	$10,265	$10,444
*Elec. Machinery	459	532	+16	591	532	532
Petroleum Industry	4,819	5,338	+11	5,363	5,441	5,609
Mining	394	409	+ 4	342	286	271
Railroads	754	777	+ 3	816	800	864
Other Transportation and Communications	3,899	4,195	+ 8	4,381	4,346	4,363
Electric & Gas Utilities	6,088	6,182	+ 2	5,974	5,723	5,952
Commercial	7,041	7,534	+ 7	7,609	6,772	6,095
ALL BUSINESS	32,091	34,209	+ 7	34,263	32,883	32,833

*Included in "All Manufacturing"

Capital Spending Turns Upward, Survey Shows: Modernization, R&D Outlays Highlight Advance

Capital spending—the laggard among the economy's prime movers during the early stages of recovery from last year's recession—has turned upward.

The 12th Annual McGraw-Hill Survey shows that U. S. business as a whole has upped its plans for investment in new plants and equipment. **Business now expects to increase capital spending by 7% in 1959,** and present plans for 1960 are already running slightly higher than those for 1959. Advance plans for 1961-1962 are only 4% below plans for 1959-1960. These plans for 1961-1962 still trail the record levels of 1956-1957, but the gap has narrowed since earlier surveys.

Electric and gas utilities, whose capital spending plans are usually among the slowest to react to changes in the business climate, report that they will spend $6.2 billion in 1959—only a few million dollars less than their 1957 peak—and close to $6 billion annually in the years 1960-1962.

McGraw-Hill's Department of Economics disclosed the upturn in capital spending after evaluating the replies to a questionnaire sent out to a broad sample of the economy. Companies reporting in the survey employ more than 50% of all workers in the group of industries where capital investment is highest, including utilities. In industries where coverage is not so complete, companies are selected to provide a representative cross section of their industry.

The survey is based on industry's replies to the questionnaires. They were received in March, and represent industry's thinking at that time. Besides the rebound in plans for new plants and equipment, highlights of the survey include:

- **Industry plans to spend more in 1959 than ever before to modernize obsolete plants and equipment.** Two-thirds of the capital expenditures planned by manufacturing companies in the years 1959-1962 are for modernization, rather than expansion.

- **Manufacturing companies were operating at an average rate of 80% of capacity at the end of 1958.** They plan to increase their capacity during the next four years, but at a modest rate compared with earlier years.

- **Sales of manufacturing companies are expected to be 9% higher this year and to show an additional increase of 18% by 1962.** If realized, these gains will bring operating rates close to preferred levels and create a need for additional capacity.

- **Manufacturing employment is expected to rise less than half as rapidly as sales**—3% this year and 8% between 1959 and 1962. (This figure applies mainly to

More Modernization, Less Expansion

INDUSTRY
1959
Expansion% Modernization%
1960-1962
Expansion% Modernization%
Chemicals 61 39 62 38
Non Ferrous Metals 63 37 52 48
Stone, Clay & Glass 48 52 49 51
Miscellaneous Mfg. 35 65 43 57
Electrical Machinery 42 58 41 59
Paper & Pulp 41 59 38 62
Rubber 14 86 38 62
Metalworking 37 63 35 65
Transport. Equip. 34 66 30 70
Textiles 33 67 29 71
Food & Beverages 23 77 28 72
Machinery (Non-Elec.) 32 68 25 75
Iron & Steel 24 76 16 84
Autos, Trucks, Parts 10 90 16 84
Oil Refining 14 86 12 88
ALL MANUFACTURING 35 65 35 65

large manufacturing companies and does not cover many other lines of employment.) Industry anticipates substantial gains in productivity over the 1959-1962 period.

• **The flow of funds from depreciation will continue to rise** and by 1962 will be 21% greater than in 1958. This increasing source of funds will provide strong financial support for business' capital spending. Almost half the companies participating say they would spend more on plants and equipment if depreciation allowances under the tax law were increased substantially.

• **Research and development conducted by business increased 12% in 1958, despite the recession.** Further increases are planned for 1959-1962, assuring a continuing flow of new products and new processes.

Modernization and research are the two brightest lights on the horizon.

Modernization expenditures by manufacturing companies will top all previous years—even 1957, the record year for total capital spending. Both in 1959 and in 1960-1962, manufacturing companies expect to devote an average 65% of their plant and equipment outlays to modernization. This is the highest proportion

(*Continued on page* 208)

GROWTH OF RESEARCH AND DEVELOPMENT EXPENDITURES

(Millions of Dollars)

INDUSTRY	1958	1959	1962
Primary Metals	$117.0	$133.4	$154.7
Machinery	605.4	653.8	778.0
Electrical Equipment	1,435.6	1,636.6	2,176.7
Aircraft and Parts	3,037.7	3,341.5	3,675.7
Fabricated Metals & Ordnance	199.1	215.0	253.7
Instruments	324.5	353.7	435.1
Chemical	607.2	637.6	752.4
Paper	52.8	57.0	71.3
Rubber	85.9	94.5	111.5
Stone, Clay & Glass	70.8	78.6	91.2
Petroleum	259.2	295.5	328.0
Food & Beverages	94.4	100.1	119.1
Textiles & Apparel	33.3	33.3	37.0
Other Manufacturing	894.6	1,019.8	1,193.2
ALL MANUFACTURING	7,817.5	8,650.4	10,177.6
Nonmanufacturing Industries	363.3	399.6	431.6
ALL INDUSTRIES	8,180.8	9,050.0	10,609.2

Battery Makers Bullish on the Potential

Exide, Gould push research; Yardney tests a prototype car with 150-mi range; Scranton Cellomatic sees potential for exchangeable lead-acid cell batteries; fuel cells studied

A recurring theme in Electrical World's series on electric vehicles has been, "The key to success is in the hands of battery manufacturers." Judging from an informal survey of battery company research executives, the key is in good hands.

Exide Industrial Div of Electric Storage Battery Co, for instance, says it is "betting on an early revolution in the field of in-city and suburban automotive transportation." And to help bring back electric cars and trucks, Exide has designed batteries and aided on the first vehicles to appear this year—Cleveland Vehicle Co's C-V delivery truck and Stinson's Charles Town-About car.

In addition, the battery company "is working with several other groups which are experimenting with electrically powered vehicles."

Said ESB Pres C. F. Norberg: "The company is supporting these efforts continuously, not only because of the obvious market for batteries, but also because electric vehicles in many modern uses have real advantages in terms of economy, performance and convenience."

First Stinson Model Rolls

Stinson Aircraft Tool & Engineering Co's first production line model, which glided noiselessly out of the firm's San Diego plant April 16, has a new Exide battery. According to Deane Van Noy, Stinson president, it has boosted the car's top speed to 90 mph, and also permits faster recharging. Cost of a Town-About's batteries is $200.

Dr Harold Zahn, vice president of Gould-National Batteries, Inc, told EW last week that his firm was developing new batteries for possible use by makers of electric cars. Although Gould is working on nickel-cadmium, silver-zinc batteries and fuel cells, "the lead-acid battery will be with us for a long time, on the basis of economy and maintenance."

The small light-weight nickel-cadmium types have generated "a tremendous military interest." Gould has explored the concept for about four years and "is in a good patent position" on it, he said.

The firm once designed a silver-zinc unit for a car entrepreneur who hoped to sell an electric car for $2,000. The battery alone cost $8,000. This fact restricts silver-zinc applications almost exclusively to the military.

SEE Nominates Officers, Directors

The Southeastern Electric Exchange has nominated officers and directors to serve for the fiscal year beginning July 1, 1959. The selections were made at the group's 26th annual conference in Boca Raton, Fla., late last month. Highlights of the meeting will appear in the April 27 issue of EW.

The nominees for officers are, left to right, Third Vice President—R. Baxter Wilson, Mississippi Power & Light Co president; First Vice President—W. C. McInnes, Tampa Electric Co president; President—F. H. Coughlin, Central Louisiana Electric Co president; Second Vice President—O. J. Miller, Duke Power Co executive vice president; and Executive Director John Talley.

New directors of SEE include A. H. McDowell, president of Virginia Electric & Power Co, who replaces E. H. Hill, Vepco's vice chairman of the board; and A. J. Watson, president of Mississippi Power Co, who replaces L. P. Sweatt, Mississippi Power chairman of the board.

Power Produced Directly From Plasma Thermocouple

A device developed at the atomic laboratory in Los Almos, N. M., has successfully produced electricity directly from the energy of splitting atoms. Called a plasma thermocouple, it works on the principle that a flow of electrons result when two dissimilar metals are joined and one is heated while the other cooled.

The tiny heterogeneous reactor substituted cesium gas for one of the metallic elements. The source of power is enriched uranium.

A 25-w bulb was kept lighted by the device during a 12-hr test. Practical efficiency of the thermocouple is expected to be about 30%. Applications for the concept may range from auxilliary power for rockets and satellites to submarine and ship propulsion.

When informed of the development at the Edison Electric Institute convention, Atomic Energy Commission Chairman John McCone called it a "major breakthrough, but it should be looked on as a laboratory test—and a very small one."

# of Electric Vehicles

Yardney Electric Corp, however, feels that silver-zinc battery advantages outweigh the high cost. The firm's consultant, Prof Henri Andre, has piloted an experimental car in France since 1954. It is powered by a 56-cell, 256 amp/hr silver-zinc battery costing $4,500.

The car has a top speed of 48 mph and can travel 150 mi on one charge. Yardney International, parent firm for Yardney affiliates throughout the world, will assist Andre with another experimental car capable of 60-mph speeds and a 240-mi range.

Yardney Electric is negotiating with prospective car manufacturers. The firm points out that battery leasing would permit a low retail car price. The silver content of the wornout batteries is redeemable, also.

As for fuel cells, "We don't think it will be available in any commercial sense for several years," Dr Zahn said. Gould is working with a number of potential users of the fuel cells, he added.

Interest in fuel cells also was expressed by M. R. Hatfield, technical director of National Carbon Co's consumer products. "We are now planning to turn our interest to commercial end uses, including electric vehicles which can be served by the direct electrochemical conversion of fuels into electricity," he said. National Carbon, a division of Union Carbide, has had a warm reception to its hydrogen-oxygen fuel cell from several government agencies, Hatfield said, "so our main efforts, heretofore, have been in this direction."

Scranton Cellomatic Battery Corp, mindful of the present advantages of storage batteries, has introduced interchangeable cells with base frames "permitting an infinite number of cell arrangements." The concept holds promise for electric vehicle makers, the firm believes, because a wide voltage and amperage range can be assembled quickly, plus the replacement feature.

INTEREST of battery makers is typified by donation of selenium-type Olympic models for WWP electric car

EEI Brief Opposes SEC Accounting Proposal

Utility attorney says SEC lacks authority, that proposal is not consonant with Commission's behavior and does not protect investors or consumers; Illinois Power Co objects

Edison Electric Institute has challenged the Securities and Exchange Commission's authority to reconstitute electric utilities' accounting practices in the matters of accelerated amortization and liberalized depreciation.

Actually, the Commission has not yet made any ruling, but it gave notice in December, 1958, that it had under consideration the announcement of an interpretation of administrative policy as to the balance sheet treatment of credits "equivalent to the reductions in income taxes."

EEI, through its special attorney, A. J. G. Priest, is evidently not waiting for SEC to grind the ruling through its administrative machinery. Priest filed a brief before the SEC on March 24 which said that a uniform accounting procedure concerning liberalized depreciation and accelerated amortization could not be made effective.

In addition, the brief opposes SEC intent on three other important points: Said Priest: "We are confronted with an existing factual situation, not mere accounting theory. Without indicating any preference for a particular accounting technique, we suggest (1) that this Commission is not authorized, under any of the statutes which it administers, to reconstitute accounting practices of electric utilities which have been prescribed by other agencies having jurisdiction, (2) that the accounting interpretation here proposed is not consonant with the Commission's own rules of conduct and (3) that the adoption of such interpretation would, in the circumstances here presented, be arbitrary, would be neither necessary nor appropriate in the public interest and would not protect investors or consumers."

Priest maintained that Congress did not intend to permit SEC to establish a uniform method of accounting under the Securities Act of 1933.

Finally, he said, the present proposal violates "the basic accounting policy which this Commission has been following for the past 21 years of accepting methods of accounting treatment for which there is substantial authoritive support."

Illinois Power Co is the only company opposing EEI in the case. On March 16 it advised the Commission by letter that EEI had no authority to represent it; then on April 8, it filed its own brief asking that the Commission "strike from the record the Memorandum of Edison Electric Institute." Its motion was denied from the bench.

PG&E Intertie Proposal Hits a Snag

BPA Administrator and Aandahl agree to suspend negotiations with Pacific G&E until six-month study indicates $75-million federal line or $4-million PG&E plan is best

Pacific Gas & Electric Co's proposal to build a 230-kv power interconnection with Bonneville Power Administration went down fighting last week before the Senate Interior subcommittee on irrigation and reclamation. The proposal would involve the purchase by PG&E of 1.3-billion kwhr a year for ten years.

Dr William Pearl, BPA administrator, and Assistant Interior Secretary Fred Aandahl agreed to suspend negotiations with PG&E until a proposed study into an additional —or alternate—federal interconnection could be completed.

Public power advocates—predominant both as witnesses and subcommittee members—chided the proposed PG&E line as inadequate and under "monopoly" control. A Bonneville-California link is "urgently needed," they testified, but it should be a 345 or 460-kv line with a capacity of 1-million kw—and it should be a common carrier line financed with federal funds—connecting Bonneville with the federal Central Valley Project.

Federal Cost: $75 Million

The subcommittee, backed up by the full Senate Interior Committee, is expected to recommend a six-month, $200,000 joint study (by Bonneville and Bureau of Reclamation) into the feasibility of a federal interconnection. This line, costing an estimated $75 million, probably would originate from The Dalles and John Day dams on the Columbia River. By contrast, the PG&E line would cost an estimated $4 million—involving 90 mi of new line (built jointly by PG&E and California Oregon Power Co). The rest of the interconnection would be over existing lines of PG&E, Copco and Bonneville.

Sens Clair Engle (D-Calif.) and Thomas Kuchel (R-Calif.) both claimed the federal tie would permit an advantageous Bonneville-CVP exchange because their loads hit peaks at different times of the year, as do their river flows.

Robert G. Gerdes, PG&E executive vice president, called his company's plan "a reasonable, practical, minimum-cost plan which will provide substantial benefits at the earliest date." He emphasized that PG&E is the only logical California market for Bonneville's surplus power, because it has a large percentage of higher-cost steam-generated power which can be displaced. He questioned whether CVP could use Bonneville power, since there is a surplus—1.4-billion kwhr in 1958—already in the Central Valley area.

Meanwhile Gov Brown has asked the California legislature for $70,000 to help finance a joint California-Oregon-Washington study of an intertie from Bonneville Power Administration projects to California's Central Valley Project.

Under a bill proposed by Brown, the Water Resources Dept could use the money for engineering and technical services. He told representatives of the study group they should not accept any short-range program.

In Oregon, a bill for a $30,000 study appropriation was expected to be introduced last week in the House. The Washington legislature adjourned before a bill could be passed to appropriate funds. Conservation Director Earl Coe, however, has committed the state to pay one-third of the estimated cost for the first phase of the study.

AEC Drafts Indemnity Changes

The Atomic Energy Commission is considering revisions in its regulations for the indemnity program in order to seal possible "gaps" in coverage. New legislation also will be needed.

Under the Price-Anderson law, the federal government offers reactor licensees indemnity up to $500-million. But to qualify, the licensee must carry all available commercial insurance.

The indemnity program has been operating under temporary regulations until permanent ones can be perfected. Policies of two insurance syndicates are tentatively accepted on financial protection requirements.

AEC, in its indemnity program report to Congress, has outlined the revisions which appear necessary:

- Policies currently cover incidents occurring in transporting fuel elements from a reactor or other facility. But they do not cover transportation of such materials to a facility unless it is government-owned.

"The insurance syndicates have advised they are considering revision of the policies to cover shipments to a covered facility from privately-owned plants as well as government-owned plants," says AEC.

- Face value of the policies offered by the syndicates does not provide for automatic reinstatement of the full face value. It is not automatically reinstated after payment of claims. Thus, in the event of an incident, there may be a "gap" in financial protection against a possible second incident until the reinstatement can be arranged.

AEC says it will propose legislation authorizing the commission to fill this gap for a reasonable period until reinstatement is arranged.

- The policies authorize the insurance companies to cancel their policies, on 12 hours notice to AEC, when the operator of a reactor or other facility refuses to correct a hazardous condition found by insurance inspectors. AEC feels that 12 hours' notice is too short for it to take appropriate action, so the syndicates are revising policies to make suspension effective at the close of the working day following notice of suspension.

Blinker Lights Protect Workmen

L. P. **BELLETINI**, Associate Engineer, Underground Lines Dept, Detroit Edison Co, Detroit, Mich.

A trailer-mounted warning light panel insures the safety of Detroit Edison Co crews working in heavy traffic areas. The panel is set up in the street or highway to warn motorists that work is in progress.

The light panel has 18 150-w amber lights and 2 150-w red lights. The amber lights blink on and off, while the red lights do not blink.

The one-ton, two-wheel trailer on which the panel is mounted has a compartment which houses the panel when it is enroute to and from the job. The panel is hinged, permitting it to be lowered from a vertical to horizontal position for traveling.

Power is supplied by a 2,000-w generator mounted on the trailer. The lights are on three circuits.

Test Photo-Electric Cells Quickly

Kansas Gas & Electric Co's laboratory staff tests photo-electric cells quickly and easily using an instrument designed for the purpose. The test equipment is made by the Fisher-Pierce Co.

The device for testing cells consists of an inclosed chamber in which light intensity can be varied. The test chamber is equipped with a lighting control calibrator, a relay operated by the photo-electric cell under test and a voltmeter that indicates voltage on the relay. A foot-candle meter indicates light intensity on the photo-electric cell.

The cell to be tested is plugged into a meter socket and placed in the proper position in the test chamber. The relay is connected to the meter socket so that it can be operated by the photo-electric cell.

When the cell is in place and the cabinet is closed, light intensity in the chamber is varied by turning a knob. An indicating light shows when the relay operates. When the cell operates the relay, the light intensity on the cell is read on the foot-candle meter.

Cells are set to turn lights on at 2 ft-c and off at 3½ ft-c. All new cells are tested. Calibration can be changed easily with adjustment on the back of the coil.

(*More EUM on page* 82)

Current Readings Check Voltage Balance

Periodic readings of feeder neutral current help Central Power & Light Co to reduce the problem of unbalanced distribution feeder voltage. This information, in conjunction with phase current readings, makes it possible to determine what corrective steps should be taken.

A plug is provided in the ground relay circuit of feeder oil circuit breaker panels to facilitate making these neutral current checks with a portable ammeter.

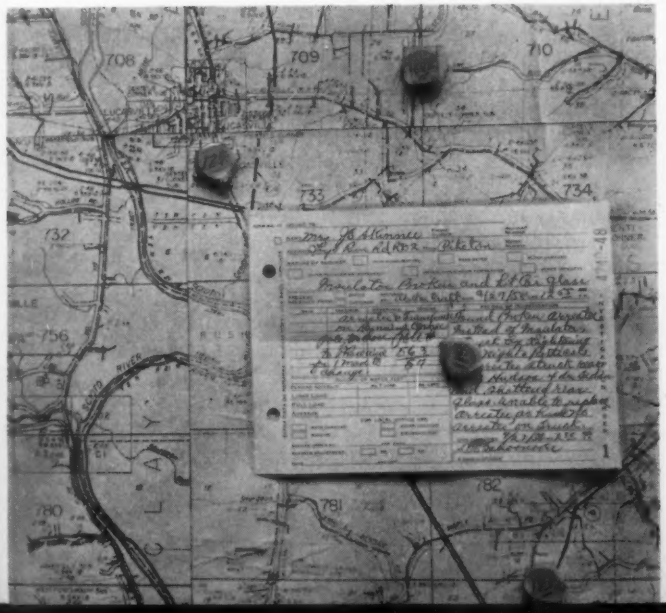
Yearly checks are also made of primary distribution feeder power and reactive demands. Portable recording watt and var meters are used to make two or three-day charts on each feeder during the summer load season.

This information not only provides area load information for future planning of feeder requirements, but also permits determination of the location and quantity of primary capacitors to be installed.

Magnetic Map Locates Trucks

B. H. BRAKE, Senior Distribution Engineer, Ohio Power Co, Portsmouth, Ohio

A large magnetic map helps control center personnel of Ohio Power Co keep track of line trucks during storm trouble. A combination of symbols attached to magnets accurately locates each truck and indicates the nature of the trouble.

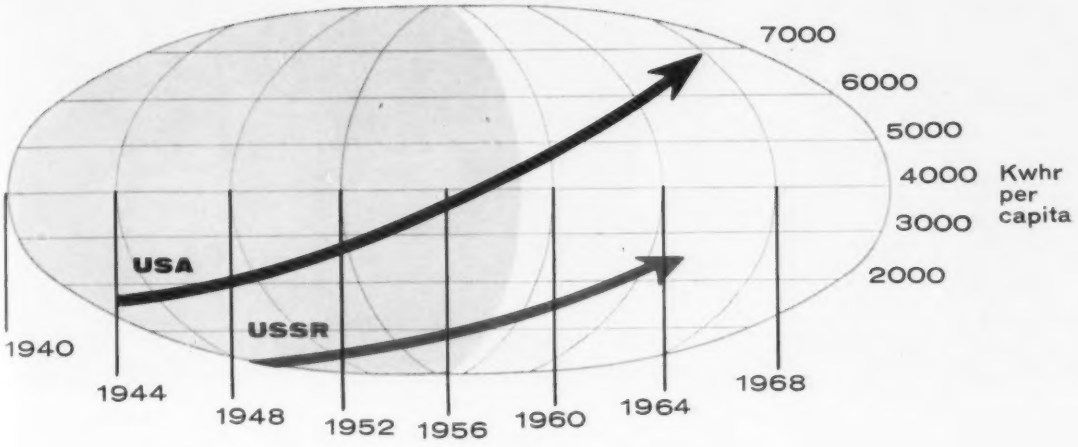


A base of ½-in. plywood was used for the map. A piece of 26-gauge sheet steel was cemented to the plywood, and the map was attached to the metal with wheat flour paste used by paperhangers. Use of the paste makes it easy to change maps when they become dirty or obsolete. The map surface can be made more durable by spraying it with clear plastic.

Numbered symbols indicating truck radio numbers were pasted over magnets representing line trucks. Other magnets have different symbols indicating lines down, poles broken off, transformers burned up, or trees on lines. The latter are helpful in giving foremen an idea of time required at each location.

Cost of the map board varies according to size. The 6 x 6 ft board in use cost $19.80. The board may also be used to keep track of crews on a day-to-day basis.

27th ANNUAL CONVENTION

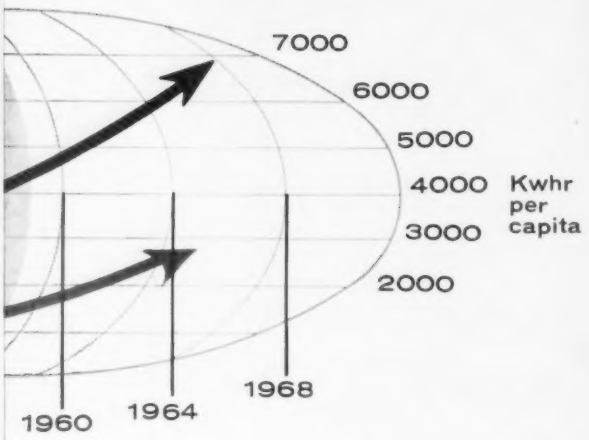


EEI Meets Soviet Economic Challenge with:

'More Power for a Strong America'

Electric utility industry leaders, meeting at Edison Electric Institute's 27th Annual Convention in New Orleans, recognize the growing Russian economic threat—and their responsibility to meet it with adequate power—as number one problem. But they do not ignore some classic others, such as government intervention, customer education, sales, system planning, regulation and rates.

Corette Pegs Soviet Economic and Federal Encroachment Threats . p 84
Busby Calls for Customer Acceptance; Cresap Warns on Inflation . . p 88
Roebling Calls Attention to Women, Wallace and George to Sales . . p 90
Interview With Allen King, President-Elect of EEI . . . . . p 92
The Atom, the Government and the Russians . . . . . p 94
Experts Examine Rates, System Planning, and Finances . . . . . p 96
Texas Electric Service's J. B. Thomas Sums Up the Convention . . . . p 98



Soviet Economic Rivalry

"Communism," said Nikolay Lenin, "is socialism *plus electricity*."

His words, echoing half way around the world and through four decades, came squarely home early this month to the cavernous halls and meeting rooms of New Orleans Roosevelt Hotel at the 27th Annual Convention of Edison Electric Institute. There more then 2,000 electric industry executives listened intently as utility, manufacturing and government leaders outlined the nature and magnitude of the Soviet economic threat . . . and the part that electric power plays and will play in it.

Speaker after speaker, from EEI president Jack Corette to Central Intelligence Agency boss Allen Dulles to Arizona's peppery Republican Senator Barry Goldwater, laid it on the line: the USSR means business, and while the comparison between the U.S. and Reds so far as electric power is concerned is favorable, the Russians are making impressive gains and we cannot afford to be smug.

(Almost as if the Soviets knew what the EEI speakers had on their minds, they announced at the American Power Conference the week before, their plans to build a 500-kv line from Kubieshev to Moscow—higher than anything the United States now has in operation—and if they can make it work under the conditions they say they can, higher than any other transmission line in the world.)

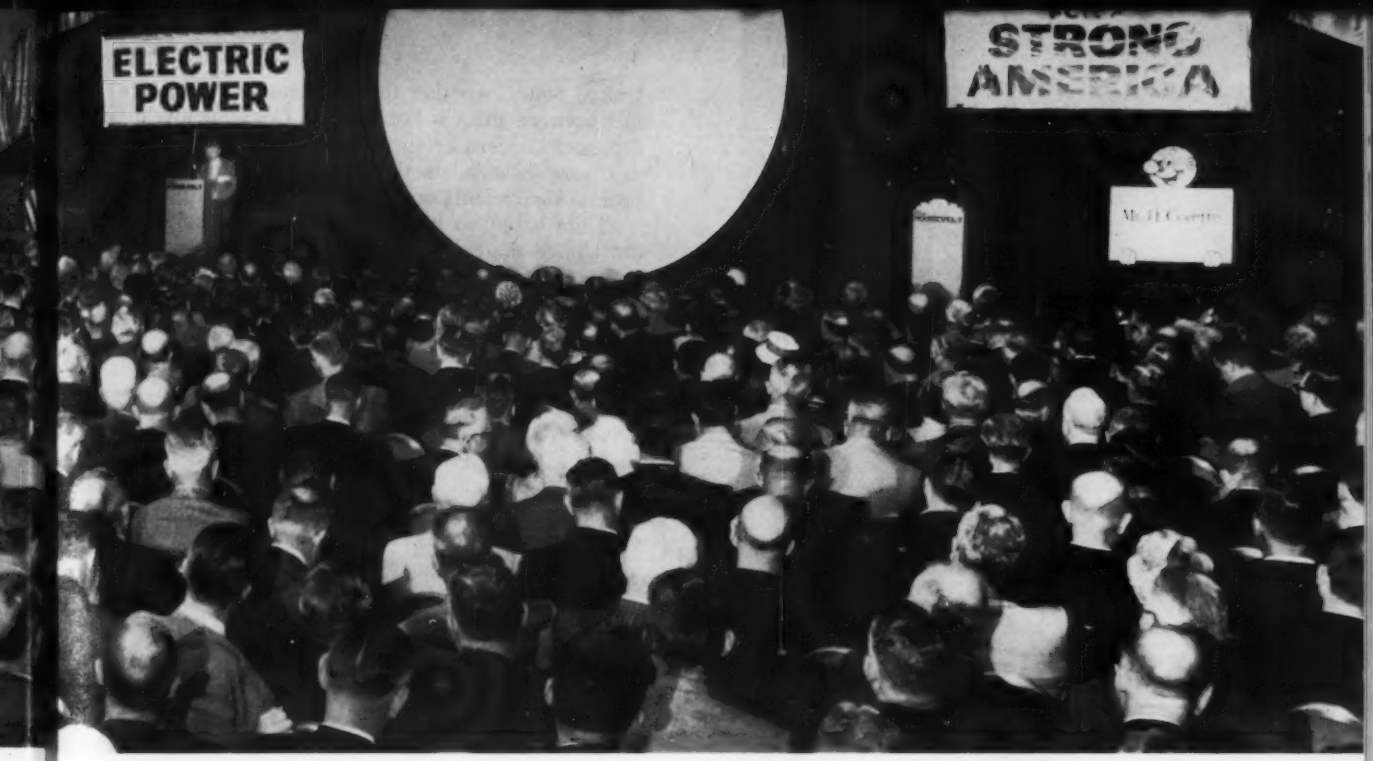
But if the economic competition between the United States and Soviet Union—and the obligations it presupposes upon the American privately-owned electric utility industry—was the dominant theme of the meeting ("More Power for a Strong America"), it was hardly the only subject discussed. High on the list in the formal sessions, the corridor conversations, and across the cocktail and dinner tables were the things that most utilitymen have come to regard as everyday conditions in their business lives: Rates, regulation, inflation, research, sales, system planning, load growth, even female pyschology (see p 90) . . . and, of course, the biggest, realist bogey of them all—the continuing, expanding threat of federal government intervention in the power business. That threat covers the entire power spectrum, from the steam-plant expansion of the Tennessee Valley Authority to federal monopoly of the atom.

USA-vs-USSR Gives Meeting its Flavor

But, important and pressing as the problems in these areas are, it was still the USA-vs-USSR story that gave the convention its theme and flavor.

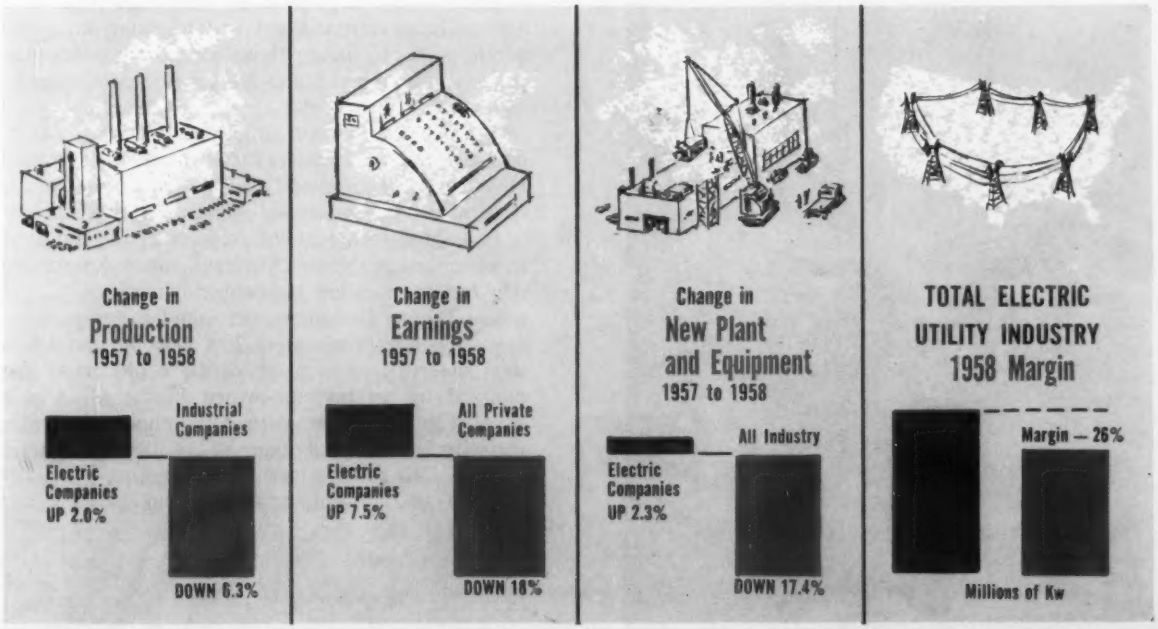
Nobody set the stakes down more clearly in this field that did EEI's president J. E. ("Jack") Corette. In both a pre-convention statement with Oklahoma G&E president Donald Kennedy and Edwin Vannard, managing director of EEI, and his formal talk before the convention itself, Corette emphasized the Russian issue. And he seemed to be talking not so much in the current fashion of fear of Russian accomplishments, but in one of confidence without complacency. Listen:

"Electricity is a vital force in both Russia and the



y Dominates EEI Convention

How the Investor-Owned Utilities Weathered the 1957-58 Recession



United States, whether the temperature of the conflict between them is hot or cold. Consequently, it is a proper concern of the American people to know just how we stand in this field, as in others which bear so significantly on the future of our civilization.

"I am happy to be able to say categorically that the United States is far ahead in electricity supply, and that there is no evidence that the Russians will catch up in the foreseeable future.

"Furthermore, the available figures show that the United States is increasing its lead in kilowatts of generating capacity."

The Montana Power Co president then went on to detail his assertions:

- The Soviet Power Ministry reported that total generating capacity at the end of 1957 was 48 million kw. At the same time, US capacity stood at 146 million kw. Our lead then was 98 million kw.
- For the future, Premier Krushchev has announced a goal for 1965 of 108 million kw. But by 1965, the United States should have 250 million kw, giving us a lead of 142 million kw.

Production-wise, Corette had this to say: "Our lead in electricity is even more apparent in terms of electricity generated for each person in the population:

- "At the end of 1957, the per capita production of electricity in this country was about 4,166 kilowatt-hours, some four times Russia's per capita production of 1,044 kwhr. Our per capita lead was over 3,000 kwhr."
- Future production: By 1965 the Soviet Union should be producing about 2,200 kwhr per capita—the US 1947 level. Our per capita production by that time will have hit 6,300 kwhr, and our lead per capita will have climbed to some 4,100 kwhr.

Picture May Be Even Brighter

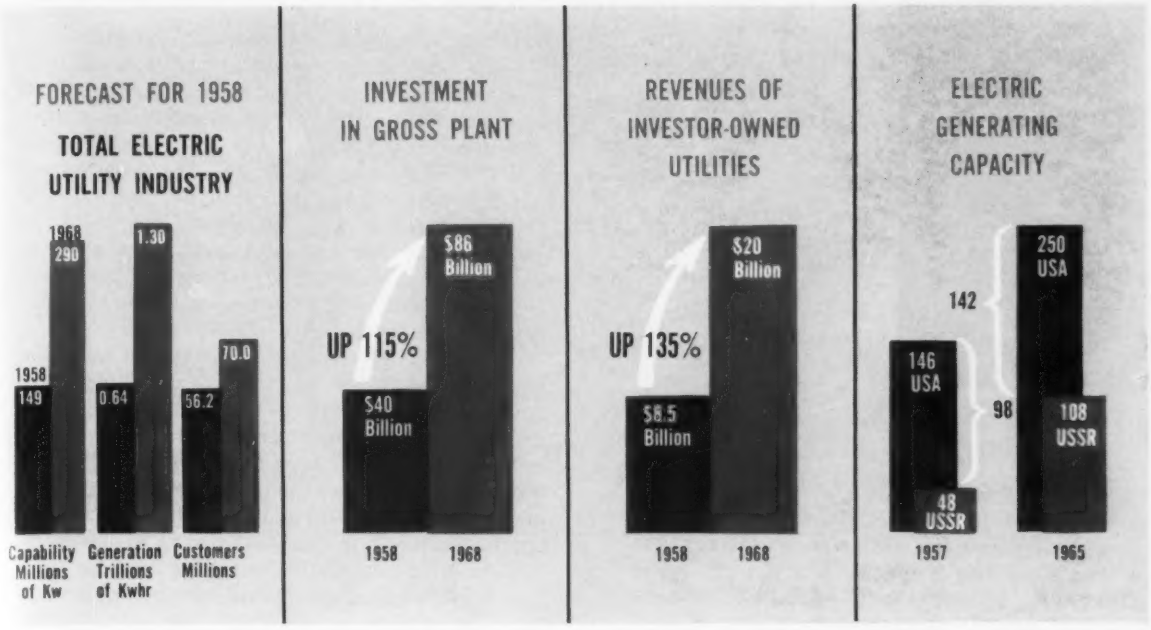
Corette feels the future picture may be even brighter than he painted it. His reasoning: The Soviets have continually failed to make their economic goals, including those for power production, whereas the United States has traditionally exceeded its electric power goals.

The Russian power situation, however, was by no means the only subject the EEI president covered. He went over in detail the present status of the American investor-owned electric utility. Briefly:

Federal government intervention is the industry's most serious problem. "Government in America today has been called political elephantiasis. . . . A recent Budget Bureau report found the government engaging in approximately 20,000 commercial business enterprises, each of which could have been handled by an investor-owned business." Corette pointed to government-owned or financed generating capacity as the best example of this government growth. In 1932 government generating capacity was 7% of the total; in 1957 it was 24%.

EEI PRES CORETTE: 'I am happy to be able to say categorically that the United States is far ahead in electricity supply, and that there is no evidence the Russians will catch up in the foreseeable future'

Where EEI Sees U. S. Utility Industry in 10 Years . . . **Compared to U.S.S.R.** (to 1965 only)



Corette then went on to hit some of the laws and agencies responsible for this growth:

• The preference clause "is an encouragement to the creation and development of government-owned, government-financed and tax subsidized power systems.

• The REA's, which, he feels, have "abandoned the concept of its creation, and have become probably the most serious major competitor to the investor-owned utilities."

• The failure to pay taxes by government systems. "Government . . . projects represent about 29% of this nation's investment in electric facilities, but their users pay only 2½% of the total taxes paid by the customers of the electric industry. The users of the facilities of investor-owned utilities, which constitute 71% of the nation's investment in electric facilities, pay 97½% of the taxes from electric properties and operations."

• The ECAP ad situation: "In my judgment, nothing is more serious. . . . This is an outstanding example of what comes from centralized government. Corette outlined the power companies' cases, both before the Internal Revenue Service (for tax purposes) and the Federal Power Commission (for rate-making purposes).

The EEI president did not neglect the less controversial subjects in the utility growth picture. He covered the recession resistance demonstrated by the industry during 1957-58 (see chart above).

Finally, he called for a seven-point "program to success" to insure the future of the nation's investor-owned electric companies. These are:

1. Continue giving your customers the best possible service.
2. Employ the best and most capable people.
3. Make your public information and advertising programs far more aggressive, active and courageous.
4. Conduct economic education programs so that the American people will learn about and protect their free enterprise system.
5. Encourage individual political activity: "We must, as individuals, join other good Americans in taking an active and aggressive interest in local, state and federal politics and in the party of our choice."
6. Encourage others to follow our example and adopt the same program.
7. Oppose government ownership courageously in every field of business as well as unnecessary governmental controls and activities.

PR Program Probably Most Important

Probably the single most important of Corette's seven points in his "program to Success" is No. 3—the need for aggressive, courageous public relations and advertising programs aimed at getting the private-utility story before the public.

The need for utilities to throw themselves wholeheartedly behind such programs, national and local,

PP&L'S BUSBY: 'Our greatest asset is the broad base for our public relations programs we have in our employees, stockholders, customers, their families'

was recognized by Jack K. Busby, president of Pennsylvania Power & Light Co in his speech, "We are Neglecting Our Greatest Asset." The great paradox of the nation's investor-owned electric companies, as Busby sees it, is this: The private utilities have done an excellent job of providing more power at lower costs; they have done well by their employees, stockholders, and above all, their customers; they deal with a large part of the American public and have the broad base for public support that that implies. Why is it, then, that the utilities are constantly losing ground to what he and Corette call "a vocal, aggressive, dangerous minority" intent on gaining control of the industry? His answer:

"Considering the many customers we serve, this minority would not be so successful if our customers generally were opposed to it and so expressed themselves. . . . The massive inertia that results in too many of our customers staying on the sidelines is a reflection both of their lack of knowledge and interest. There is forced upon us the unwelcome conclusion that these conditions would not exist except that in some manner we are neglecting our customers. This must be changed. To survive and grow, we must have their acceptance and support."

Job Has Many Roadblocks

Busby does not underestimate the size of the job of gaining the public's "acceptance and support." There are a number of specific roadblocks—the correcting of misinformation, the lack of information, criticism of high prices, etc—that must be overcome, all within a broad, realistic framework: "We must be realistic enough to recognize that when we tell our story . . . our customers will think we are asking for their help in order to further some interest of ours. . . . To get our customers to listen, the categorical imperative is for us to demonstrate that we are protecting and advancing their interests. . . . They must be satisfied that our utility companies are being run first and foremost for them, the customers.

Some of the specific problems pegged by Busby:

• According to a recent Central Surveys study done for P.I.P., 21% of the private utilities' residential customers believed they are served by public power, federal, state or a co-op. This must be corrected through intensive education programs. Ironically, the name of a company can compound this ignorance. A line of questioning in one survey showed that customers tend to think they are served by a state agency if the company name includes the state's. Likewise for companies serving cities.

• Some 31% of the private-company customers are critical of the cost of electric service. "It is high time we begin to explain these higher (due to increased usage, not increased cost of the kwhr) bills in terms that can be understood by the customers, because their bills are going to increase at a rapid rate . . . as kwhr usage increases with the advent of electric heating." Customers, the PP&L president feels, must be prepared by the utility for this.

• Another public notion that must be dispelled by the utility concerns regulation. Utilities must be outspoken in their advocacy of strong, competent and well-paid independent regulatory agencies. "We must make sure that our customers understand that we do not shy away from regulation." Utilities should take advantage of rate hearings to show how well they've held the line on cost of service.

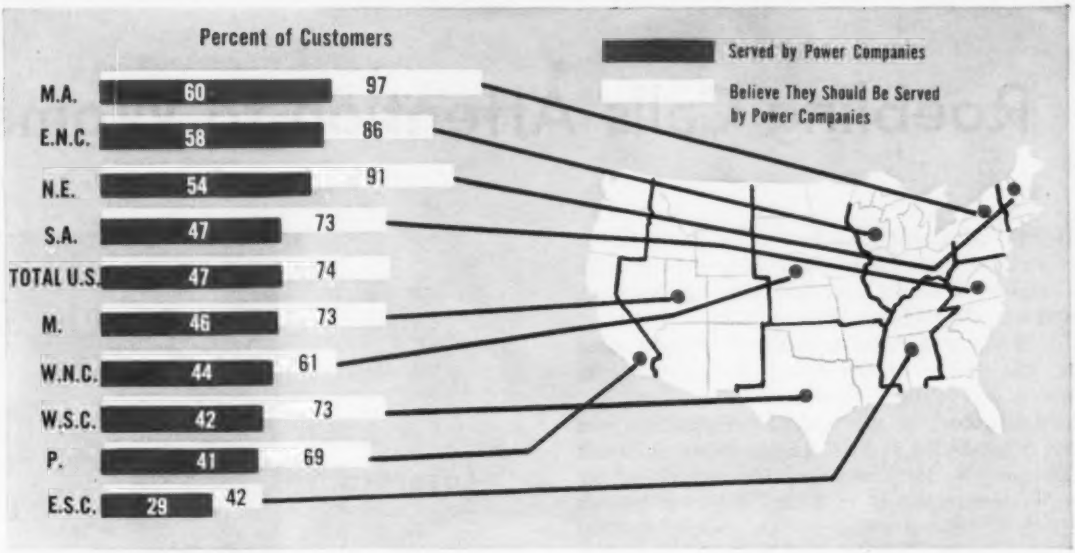
'An Indictment and a Challenge'

Busby ended by showing a chart (see opposite page) on customer attitudes on the public power issue. It shows a regional breakdown of customers in the U. S. who are served by investor-owned electric companies, and who think that such companies should supply electric service. "To me, this chart is both an indictment and a challenge. I suggest we continue to make surveys and prepare such charts to measure changes in our standing. We dare not delude ourselves, and we should not rest until we have very substantially improved the percentage of customers who believe in service by the business-managed utility companies."

For all the seriousness of the federal power threat, it is not one which utilities feel universally. Companies which have no direct threat to their service areas tend to shrug it off. But there is one problem all utilities—indeed, all business and all our people —feel: Inflation. The constant shrinking of the American which dollar has everyone from President Eisenhower to the fixed-income breadwinner worrying. And at New Orleans last week, one of these worriers was dapper, precise Mark W. Cresap, Jr, president of Westinghouse: "There is one big problem that could darken the outlook for our future. That problem is inflation, and its inevitable consequences.

"The cure for the inflation in our economy may

Regional Opinion Survey



be complex, but the cause of it is quite clear. We have been distributing the fruits of our production faster than we have been earning them. We have been raising wages faster than we have been raising productive efficiency."

Cresap made no attempt to exonerate his own company from this charge. The big Pittsburgh-based manufacturer, like others, had not been matching wage hikes with productivity increases. Result: A serious cut in profit margins to keep prices attractive and keep as many people on the job as possible.

Cresap went on to document the cost-price squeeze effects of inflation on manufacturers, claiming that "wage rates are lifted by the pressure of national unions to what only the most efficient companies can pay."

Our economy, Cresap feels, now stands at a delicately balanced point, and we have a "crucially important decision to make." We have two choices:

1. To continue "the same wage-price spiral policy we have followed since the war," granting unearned wage increases and then try to recover costs by raising prices still higher; or

2. To hold the line on wages and prices, limiting the trend of annual wage increases to the trend of productivity increases.

Labor, Cresap claims, is in danger of pricing itself out of the market, and "Labor has already priced itself out of a large segment of the export market for electrical equipment." Inevitably, he got around to the recent TVA purchases of foreign generating equipment, and blamed (1) the high cost of American labor "completely out of line with world rates; and (2) the "short-sighted over-emphasis on initial cost" of agencies of the federal government.

Cresap's Rx is two pronged:

- Accelerate productivity by producing more efficient generation, transmission and distribution of electric power; by helping to improve productivity of industrial customers through increased electrical usage; and by continuing research and development.
- Hold the line on wage increases that are in excess of productivity increases. The public must be made aware of this. Utilities must use their contacts with the communities to do this.

WESTINGHOUSE'S CRESAP: 'Inflation is the one big problem that could darken our future'

Roebling Calls Attention to Women, G

As if the admonitions of Corette and Busby on the federal power threat and Cresap on that from inflation weren't enough, EEI convention-goers were treated to a stinging recountal of all the elements of one of this man-dominated industry's biggest blind spots: *the failure to recognize the importance of women in everything it attempts to do.*

Administrator of this verbal whiplashing was pretty, quick-witted Mary Roebling, board chairman of Trenton (N. J.) Trust Co. Her speech, titled, "Are Women Important in Your Life?" was its own best answer. And it added up to a resounding "Not from the looks of the way you're running things!"

Disclaiming any attempt to be a Cassandra, she quickly pointed out the prominence of women today as stockholders, employees, voters, and mothers. Her early fire was concentrated on the failure of utilitymen to cultivate women opinion leaders, as they do men: "I would think that an industry with so much of its future directly related to what happens to them through the expansion of TVA might well be interested in getting closer at least to those women who might be called "opinion leaders to make sure they know and understand about TVA, and about the bills now before Congress."

Admitting that the light and power industry was essentially one with a masculine "image," she maintained that this was all the more reason why women must be kept informed about what's going on in it. Other reasons:

- They are your customers.
- They use the appliances that boost sales.

GEORGE: 'The need for NELP became apparent when we saw our sales advantage slipping away'

ROEBLING: 'I would think that your industry would want to get closer to women leaders'

- They own your securities and are increasingly in evidence at stockholder meetings.
- They are voters who affect the issues.
- There are many women in public office, including the Congress.
- They are the mothers of a generation which will suffer if the enemies of free enterprise prevail.

The lady banker outlined three areas in which the power companies must consider women:

1. Public relations and women power, in which you must (a) stimulate the increased use of electric power, and (b) "define and emphasize the merits of private enterprise in the electric utility business.
2. Tax fairness and women—relate the present tax inequalities in the power field to her role as holder of the household purse strings. She is a conservative creature in this regard, and will quickly get the point.
3. The necessity for business to get into politics at the grass roots level. Utility executives must become politically active, and encourage their employees and business associates to do likewise.

But if America's light and power companies have neglected the political potential of women, they have not, of late, overlooked her sales possibilities.

Listen to what one member of a group of EEI Commercial Division executives, reporting on the industry's National Electric Living Program, and specifically on the media to be used, said: "Daytime television shows (will be used) to give massive efficient coverage of the housewife and to complement

George and Wallace to Sales

the bigger nighttime shows of the appliance manufacturers."

But as Detroit Edison's Ed George, pointed out, there were other reasons for NELP. "The need for it became apparent when we saw our sales advantage slipping away from us because of the aggressive promotion of our competitors . . . Leadership was needed to change our course and your EEI program is now supplying that . . . Otherwise we would wind up on the reefs of declining sales." Some of those reefs:

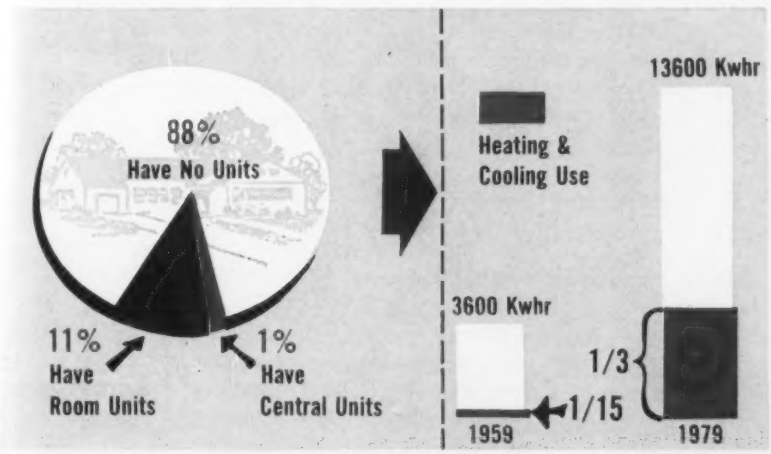
Range sales are proceeding too slowly. The electric range's 31% saturation, plus the fact that one electric range is sold to every 1.4 gas ranges, means range load will not contribute enough to future load growth.

Water heaters—From a 1948 sales ratio of one electric water heater to every 1.5 gas, the industry has slipped to one electric to every 3.3 gas in 1958.

The electric clothes dryer, which dominated the market 10 years ago with five sales to every one of gas, has now shrunk to a two to one ratio.

Despite the losses incurred, the heart of the matter lies with the most promising load builder the industry has ever known: electric heating and the all-electric home. Listen: "One thing is certain. It (the competitive battle) cannot be won without space heating . . . The key to the solution is the all-electric home with house heating. In 1958, there were 500,000 electrically heated homes. It is estimated that we need 4 million by 1968."

The 'Climate Control' Market . . . and What It Can Mean



C. M. WALLACE, JR maintains that climate control' is the only way the industry can maintain residential growth rate

And the treasure to which space heating or "climate control," as he prefers to call it, is the key was ably described by Georgia Power Co vp C. M. Wallace, Jr. Actually, "climate control," as Wallace uses it, includes all forms of electric space conditioning—heating, air conditioning, humidity control, etc. In his detailed " 'Climate Control' in Load Growth," he said, "climate control can prove to be one of the greatest load-building opportunities in the history of our industry." A Wallace example: A typical company with a rate of 1.4¢, operating at 66% load factor, can improve its percent return by 1% simply by increasing its electric heating saturation by 10%. His principal admonition:

"If we are to increase our residential sales in the future at the rate of the past, we have to build this heating and cooling at a more rapid rate. In 1959, with national average use at 3,600 kwhr per residence, we find heating and cooling account for 1/15 of residential use. In 1979, the 'climate control' segment of the residential load should amount to ⅓. This is the job and the challenge facing us."

NSP's Allen S. King to Take EEI Reins

An operating, industry man with an M.I.T. degree in electrical engineering will head the Edison Electric Institute during the next year. Although over-simplified, that statement describes Allen S. King, president of the Northern States Power Co.

King worked six summers for the company while he was in school and then in 1922 went into construction. Following this he was a results engineer, general superintendent of the Fargo Division, manager of the Minot Division, the Grand Forks Division and the Fargo Division. He became executive vice president in 1951 and finally president in 1954.

As the record of his company implies, King brings to the EEI a diversified industry experience which will permit him to deal intimately with the political, technical, sales, and statistical problems of the Institute.

In an exclusive interview with the staff of Electrical World, King spoke frankly and for the record on many important industry matters. When asked "What is your pet subject," King answered, "building an industry image like the individual company images."

This subject is truly the one to which King wishes to devote a great deal of effort. Emphasizing this idea in his acceptance speech, King said, "Each one of our companies operates in some exclusive area of the country. We solve all of our operating problems on a local basis. We are really operating right down on 'Main Street.' That is our great strength. On these great national issues we must remember that there is no simple way of getting our story over. We cannot buy the job done—advertising alone will not do it—no national organization can do more than coordinate and stimulate — the real job is ours right down on 'Main Street.'

"If each one of our companies would realize that it alone can reach the people in its territory—that such an approach is the only effective way to reach people—and would then lay plans to work with its neighbors, friends, and customers, we could make a real impact upon the thinking people of the country. All it requires is that each company assume full responsibility in its own area."

Q. *Mr. King, what do you think of Mr. Corette's "Program to Success" which he presented in his president's address?* (*See page* 87).

A. I think it is an outstanding program and that we should devote ourselves to working out ways and means of putting the program into effect.

Q. *How should the utilities participate in industry research?*

A. The utilities have to bear the cost of research regardless of who does the actual work. There are fields where the manufacturer is the logical one to carry most of the burden but where atomic power is concerned, because of the desire for a crash program for national reasons, the cost is beyond the financial resources of the manufacturers and therefore indicates the need for utility assistance.

Q. *What do you think of the recent order of the New York State Public Service Commission regarding the treatment of accelerated depreciation?*

A. I think that the commission went too far in indicating that it would assume that the utility was taking rapid depreciation whether or not it was in fact. This should be a management prerogative and should not be subject to commission dictation.

Q. *Are you concerned over the prospects of a Congressional investigation of the interconnections between the utilities?*

A. No. We already have a substantial national grid which the utilities have set up themselves. As the need arises for further interconnections and grids, the utilities will take it upon themselves to build them as they have in the past.

Q. *Should there be closer cooperation between the power companies and the other power suppliers including the federal agencies?*

A. There is no reason why we should not work closely with these other agencies in solving the power supply problems of the country even though we do

not agree in principle with their basic concept, their tax free status or their subsidies.

Q. *Operating as you do in a cold climate, what is your view of the prospects for electric space heating?*
A. It is obvious to me that even in my territory electric resistance heating can be sold. We have a 1½¢-a-kwhr bottom residential rate for this purpose. I believe, however, that it is desirable to promote year-round air conditioning in order to secure a better balanced load.

Q. *Mr. King, would you care to comment further on the matter of the industry's corporate image?*
A. Yes, I am very interested in this subject. It is very difficult for "Madison Avenue" to interpret "Main Street." That is, it may be that we have been permitting a view of our industry quite separate and distinct from the corporate image we have created in our own communities. Our attackers talk in broad general terms, and on more or less of a national scale. They are careful not to define their terms, nor to stipulate just exactly whom they are attacking. They seem careful to avoid attacking a company or the corporate image our various companies have developed in their own territories. Never do we hear an attack made honestly and straight forwardly upon a man, a group of men, or a company. The so-called "predatory interests" are never defined, nor are we told just who will get the unjust profits. The whole area of attack is kept vague and carefully avoids the corporate image that each of our companies has created in our own areas. This may give us a basis for action.

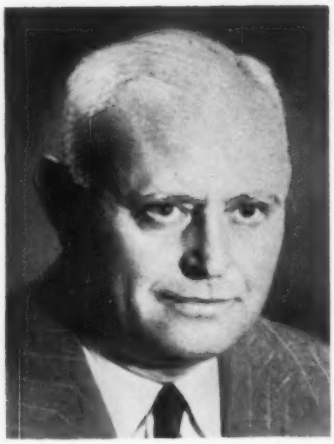
Q. *What position should the Edison Electric Institute take in representing the utility industry to the public?*
A. We should be the "voice of the industry." We should give the feel of the industry to the public. The EEI should carry the main responsibility for the public relations program and represent the composite of the industry to the public.

Q. *There have been some recent suggestions that the utilities should increase their bonded debt ratio above 50% and reduce or eliminate the preferred stock ratio? What is your opinion on this subject?*

A. Each company with regulatory approval must decide this matter for itself. However, my own view is that a structure in the area of 50% debt, 20% preferred and 30% common stock would be about right.

Q. *In your acceptance speech you indicated that some people say the electric utilities are not part of the free enterprise system. Would you expand on this point?*
A. Yes. Looking backward everyone should realize that the growth in the use of electricity by our customers was due to the ingenuity and efforts of those individuals in the electric power industry. This industry grew up through typical free enterprise corporate identities, reflecting the best of the capitalistic system. The regulatory process has not changed this characteristic.

Speakers See Atom, Government, and So



CHAIRMAN of A-power panel Elmer Lindseth wants 'transitional' government role in developing the atom

It is impossible to think or speak comprehensively about the future of the American privately owned electric utility industry without considering the atom. And it is impossible to think about the atom without taking into account (1) the federal government's role in developing it; and (2) the implications of cheap, readily available atomic electric power in our continuing struggle with the Soviet Union for the allegiance of the free world.

While no one denies the pressures for the rapid development of commercial A-power, there are a wide variety of opinions on how best to go about achieving it. Here are some of the thoughts of EEI speakers . . .

Elmer Lindseth, president of Cleveland Electric Illuminating Co, and chairman of EEI's committee on atomic power, thinks the government's role should be "transitional, with responsibility transferred to industry as soon as practicable."

Sen Barry Goldwater (R-Ariz.) cautions that the atom is going to replace hydro power as the stepping stone for federal power advocates to reach their goals, and it bears all the more watching, according to Goldwater, because "it puts the threat of government power in any area."

AEC Chairman John McCone wants "unrelenting effort" from the electrical industry, both public and private, to solve the technical problems that block the way to economical A-power. McCone feels that "doctrinaire arguments about public-vs-private power may well jeopardize our progress toward "our own power needs . . . and to our world position." What McCone means is that commercial A-power can be a powerful instrument in our hands in helping raise the living standards of the so-called underdeveloped countries and thereby bolster their resistance to communism.

Allen Dulles, director of the Central Intelligence Agency, apparently agrees with McCone: "By 1965, Soviet output of some raw materials and industrial products will be approaching, and in a few cases exceeding, that of the U. S. These products (or services, such as cheap electric power) will be needed for industrialization of the less developed countries. The outcome of this contest is crucial to the survival of the free world."

A-POWER PANEL is made up of, l to r, Titus LeClair, Commonwealth Edison; R. J. Coe, Yankee Atomic Electric Co; H. A. Wagner, Detroit Edison; and G. R. Hadden, Con Edison.

Soviet Threat All as Interrelated

McCONE

GOLDWATER

DULLES

But while there may be squabbling among the private and public power advocates as to who shall do what, the investor-owned utilities have been making progress, Lindseth and four other utility executives—G. R. Hadden of Consolidated Edison, New York; R. J. Coe of Yankee Atomic Electric Co; R. G. LeClair of Commonwealth Edison, Chicago; and Detroit Edison's H. A. Wagner—in a panel titled, "Atomic Power; A Status Report and a Look at the Future," outline the progress to date of private A-plants, both existing and planned. They also took a look at the year ahead. Highlights:

- Three A-plants are operating; ten are under construction; and two are being planned. Total expenditures on these 15 projects is $540 million.
- Eleven companies are participating in R&D projects for A-power reactors or concepts.
- Altogether 131 utility companies are working on some phase of nuclear power.

Panel members gave progress reports on their respective company's A-plant operations.

Con Ed's Indian Point is moving ahead on schedule and should be completed by April, 1961. The company has already spent about $28 million of the estimated cost of the plant of $100 million. Some $10 million will have been for research, development and testing.

The Enrico Fermi A-plant at Monroe, Mich, is being built by Power Reactor Development Associates, a non-profit group of 21 companies. Detroit Edison will own and operate the conventional part of the plant. The breeder plant is expected to be on the lines in August of '61, following a full year of nuclear testing. Total cost is $78 million.

Work on Commonwealth Edison's Dresden plant is now about 75% complete. The first full-scale, privately financed A-plant in the U. S., it will have a boiling water reactor and a net output of 180,000 kw. Plant is expected to be operating by the middle of 1960.

Yankee Atomic Electric Co, formed by a group of New England utilities, expects to have its pressurized-water plant completed and ready for start-up next year. Total cost of plant to Yankee is set at $57 million, plus $5 million in R&D assistance and waiver of fuel-use charges from AEC.

What does the future look like for nuclear plant development?

AEC will probably build four small reactors. One will be an organic-moderated reactor at an AEC facility; a second, also to be built at a Commission site, will be an experimental low temperature process heat reactor; the third, a boiling water type, is expected to be offered to a private, public or co-op organization for operation and ownership jointly with AEC. The fourth reactor will be a small power one, may be built by AEC for a co-op or public power organization. It would be under arrangements similar to those now being put up for the Piqua, Ohio municipal, or the Elk River, Mich., co-op plant.

Experts Examine Future Problems of

The future of the investor-owned electric utility industry, while it looks bright, is going to require considerable attention in at least three areas to make it so. These, according to speakers at the EEI convention, are:

1. **Pricing policies** that are realistic; that take inflationary effects into account; and that reflect "evolutionary . . . experimental" new concepts.
2. **System planning** with emphasis on capacity, acceptability, reliability and economy.
3. **The maintenance of good credit standings,** in order to be able to obtain the necessary funds for expansion.

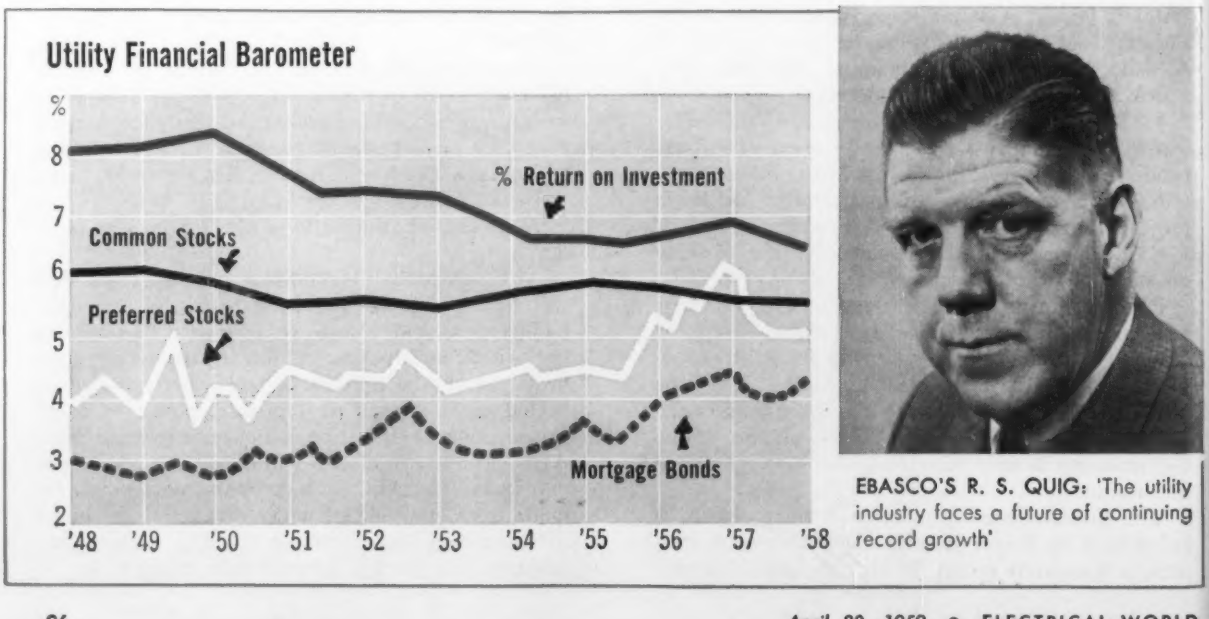
The first of these areas, to which Robert S. Quig, manager of Ebasco Services, Inc's rate department, addressed himself, is in some ways the most important. After all, the function of pricing—more properly, rate making—is, in Quig's words, "To produce the revenue that will enable the company to provide adequate service for its customers at a fair profit to its investors." Furthermore, rates, according to Quig, may be the key to public opinion on the whole private-vs-public power issue.

Unless utilities begin to take inflation into account in their rate-making, they are going to find their earnings-to-common ratio will continue to decline, and that the higher return the investor expects through the normal functioning of the regulatory process will not come about. Result: the position of utility common stocks in the market will be seriously damaged.

This portends for them, says Quig, a new attitude toward regulatory policies. Specifically, they should seek to broaden inquiries beyond the accounting control level, inform regulators about their investment and policy problems. Quig then comes to his central point of advocating "fair value" as a means of recognizing the inflationary effects on utility pricing and financing matters. He recommends a special staff to handle rate-making, Its functions:

- Develop the rate structure that will produce, on a continuing basis, the growing revenue requirements of the company.
- Administer the rate structure according to regulation, and still maintain good customer relations.
- Represent the company before regulatory commissions and similar groups interested in rates.
- Conduct research on loads and operations to obtain better rate-making information.
- Keep management well informed on rate, regulatory and economic matters.

While inflation, or rather its effects, may be one of the most formidable problems the industry must face, it is by no means the only one. The whole realm of system planning, said Philadelphia Electric Co vp Lewis R. Gaty, will pose not a few roadblocks around which the utilities will have to run—or stum-



EBASCO'S R. S. QUIG: 'The utility industry faces a future of continuing record growth'

# of Rates, System Planning, and Finances

ble. These fall into four general areas—capacity, acceptability, reliability and economics. Gaty's thoughts on each:

Capacity gains can be made through the further development of larger, more efficient units, but the future will probably see capacity requirements met more through adjacent system interconnections. Utilities will have to go to automatic dispatching and control as these interconnected systems grow larger. He also took a swipe at the utility cyclic ordering pattern for heavy equipment, maintaining that manufacturers will be hard pressed to meet orders as capacity additions approach 15 million kw, circa 1963-64.

DORAU: 'Rates, a fair return for the investor, and better public service'

GATY: 'System planning and capacity, acceptability, reliability and economy'

Acceptability of the larger utility facilities is becoming increasingly difficult in many communities, according to Gaty. Some of his possible solutions include: use of existing utility and non-utility rights of way underground transmission; 600 to 1,000-kv dc transmission, as conversion and inversion equipment becomes cheaper; and underground distribution, with its higher initial cost at least partially offset by less frequent storm damage and outage costs.

Reliability of future systems, with their much greater complexity, will also be a problem. Inadequate secondaries and wiring on the customer's property, Gaty feels, may be improved by going to higher secondary voltages. For residential and commercial customers, an answer might be to put the major appliances and air conditioning on the higher voltage, and keep lighting and small appliances on the lower.

Economy, finally, must come of all of this, says Gaty. And the key to economy is cooperation between utility and manufacturer in research and development to hold the line on costs.

The third concern of utilities for their future is—of all things—their credit. As Dr Herbert B. Dorau, professor of economics at New York University, put it: "That this industry . . . 'America's No. 1 corporate credit', should be sufficiently concerned about its capacity to command capital . . . would seem at first anomalous . . . Yet the healthiest are often most concerned about their health, and the best students seem . . . most concerned about their examinations. Maybe that is why the superior remain superior . . ."

Dorau asked utilitymen to ask themselves whether (1) they are in fact as good as the investor thinks they are; (2) whether they will be able to live up their reputations and meet the investor's expectations; (3) whether developments external to the industry, despite the industry's excellence, which will make it difficult to obtain future needed capital; and (4) whether, in view of present conditions, some basic changes in utility financial policy are not called for?

Dorau did not waste time on the first two questions; what concerned him were the latter two. He did not play down the tendency of the threat of government *encroachment* to disturb investor relations, but he seemed to concentrate on inflation, and the squeeze it is putting on utilities to continue making their securities attractive, another way of saying keeping their credit good. His principal point, is that utilities must educate the regulatory commissions to the idea that rates which will yield a fair return are absolutely essential to the ability of companies to attract the necessary capital to expand, and therefore better serve the public interest.

TESCO's J. B. Thomas Sums Up; Stresses 'Imagination of Men'

The difficulty of summarizing a meeting such as the 27th Annual Convention of EEI rises in proportion to the range and complexity of the subjects its included. This year the job fell to the president of Texas Electric Service Co—tall, articulate, J. B. Thomas.

Thomas reviewed the range of problems covered by all the speakers, but he came to rest on the future role of the private utilities in the development of nuclear power, a subject in which he himself is no mean authority. He has done much to focus utility A-power efforts.

Indeed, he was one of the main driving forces behind the formation of Texas Atomic Energy Research Foundation, a non-profit group of Southwest utilities now doing its principal work in investigating the feasibility of using hydrogen fusion —rather than uranium fission—as a heat producing source for the generation of electricity.

Fusion May Be Utilities Answer

It is Thomas' view that with the federal government's monopoly of nuclear fission fuels, and the strict regulation that can be expected by private utilities in the building and operation of fission plants, any working arrangement which utilities will have to operate under may not really qualify as "private enterprise." On the other hand, fusion plants use hydrogen, not enriched uranium or plutonium, and hydrogen is a readily available and not regulated. It is, therefore, in the investor-owned utilities' interest to pursue the hydrogen fusion line of development on their own.

He then went on to elaborate on another point the challenge facing today's leaders to find and develop tomorrow's. Said Thomas:

Importance of Imagination

"I want to emphasize the fundamental importance of the imagination of men in this business of ours; how important the imagination has been since its very inception and through all its growth and development. Today we are failing to attract from our colleges and universities many of the most brilliant men because they are lured by the challenge of research in atomic energy, in electronics, in space, in physics, in the chemistry of plastics and like undertakings, and have let them feel, not without some good basis in fact, that there are no such challenges in the electric utilities today.

"How to interest these young men we want in the challenge our business affords and to prove to them when they come to us that such a challenge is there, how to stimulate and inspire them as we train them, so that the sparks of their imagination will keep us alert and growing and changing for the better, is one of the great problems of management in our industry today."

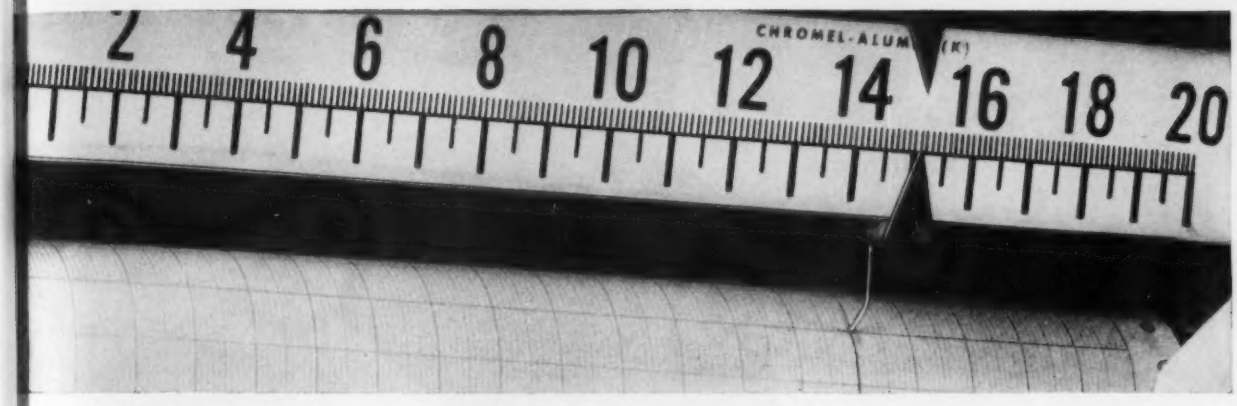
What Thomas was saying, of course, is that the privately owned utility business—like all human activities—is no better or worse than the people who make it up. What they do determines its future.

And so it does.

Edison Electric Institute Officers, 1959-60

The following executives were elected to the offices indicated at the 27th annual convention: Allen S. King, Northern States Power Co—President; Sherman R. Knapp, Connecticut Light & Power Co—Vice President; Edwin Vennard, Vice President and Managing Director; H. S. Sutton, Consolidated Edison Co of New York—Treasurer; and A. B. Morgan, Secretary and Assistant Vice President.

standardizes itself continuously . . .



This new General Electric Type HF recorder is continuously self-standardized. And it's typical of the new G-E null-balance strip-chart line. No more batteries, standard cells and standardizing mechanisms . . . new silicon diode voltage source now makes possible completely uninterrupted measurement and control—with measurement accuracy of ± ¼ percent. ***Unitized plug-in construction*** provides simple design with isolation of components by function. All major components are mounted on swing-out mechanism panel for easy servicing outside case. Both single-pen Type HF and two-pen Type HL are available. Or, for an intermittent record of up to 20 different signals, G.E.'s new Type HG multi-point recorder prints as fast as 1.2 seconds per point. All types measure ***wide range of parameters . . .*** pen speeds from 1 to 24 seconds, chart speeds from 1″/hr to 360″/hr, plus many other optional accessories and a variety of control forms. Get the complete story about these and many other outstanding features. Just call your nearby G-E Apparatus Sales Engineer, or write for bulletin GEA-6887, Section 595-102, General Electric Company, Schenectady, N. Y.

Other Instrument Department Recorders for Electric Utilities— *Inking and inkless; portable and switchboard; duplex and twin; hook-on recording volt-ammeters. Photoelectrics, oscillographs and vibrometers.*

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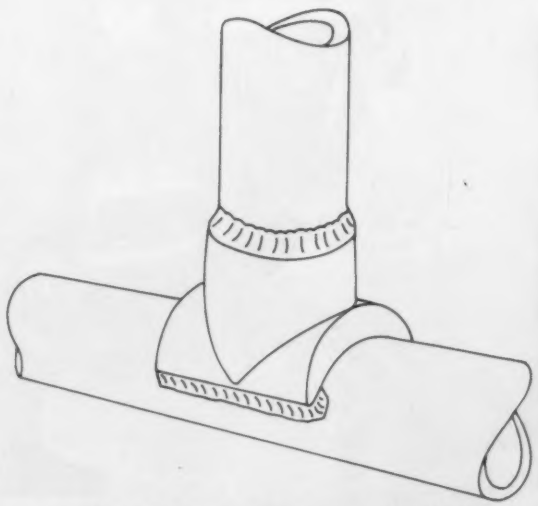
Welding Installation Data for Generator Leads*

Data are provided on welding aluminum tubes and fittings for installation of generator leads; compiled by a Southwestern utility†

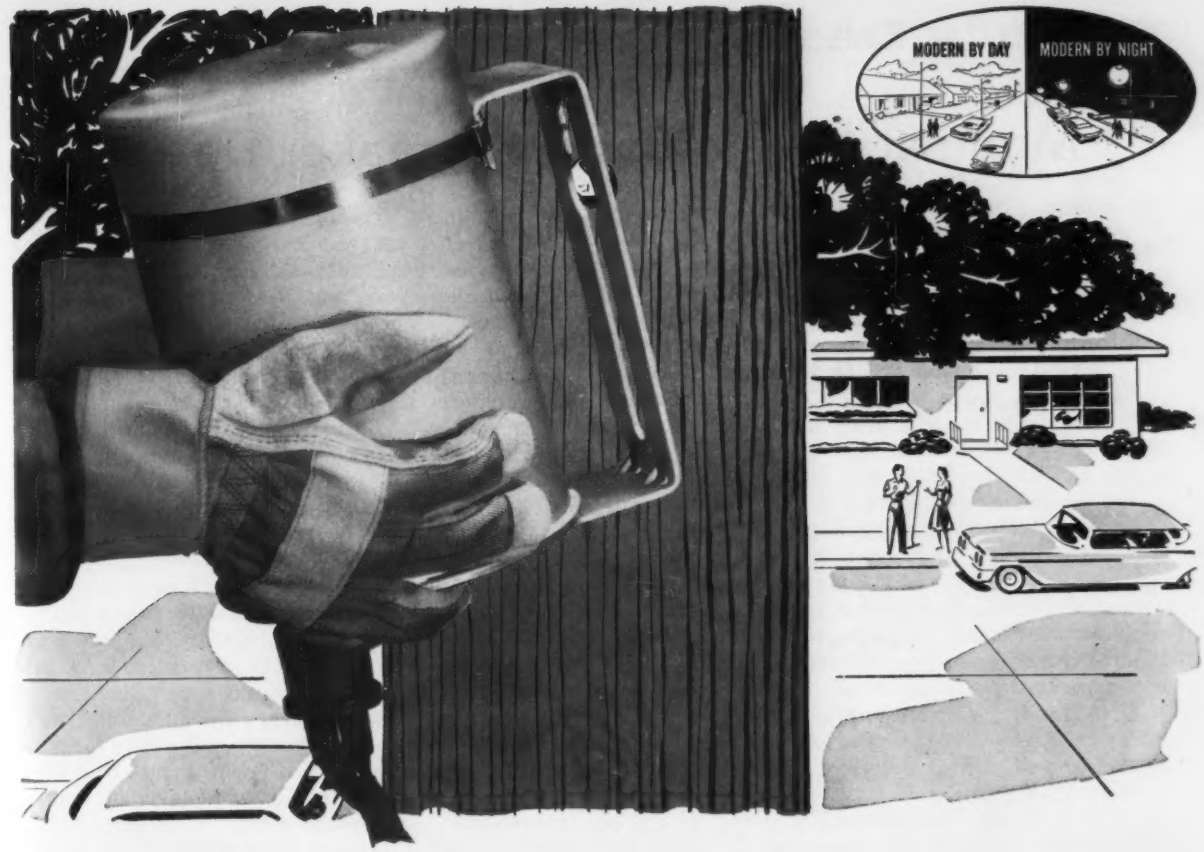
Welding Operations for Generator Leads

Description	Number of Welds	Linear In. per Weld	Total Linear Inches
Corona Bell for 4 in. EHPS	5	14.13	70.65
Corona Bells for 6 in. EHPS tube	20	20.8	416.00
Coupler Connectors for 4 in. EHPS tube to 2–1,000 MCM bare copper terminal connectors tap	3	14.1	42.30
T-Connectors for 4 in. EHPS tube run to No. 4/0 AWG terminal connector tap	3	10.1	30.30
T-Connectors for 4 in. EHPS tube run to 4 in. EHPS tube tap-4 in. tap	3	14.1	42.30
T-Connectors for 4 in. EHPS tube run to 4 in. EHPS tube tap-4 in. run	3	27.0	81.00
T-Connectors for 6 in. EHPS tube run to 6 in. EHPS tube tap-6 in. tap	14	20.8	291.20
T-Connectors for 6 in. EHPS tube run to 6 in. EHPS tube tap-6 in. run	14	45.8	641.20
T-Connectors for 6 in. EHPS tube run to 10 in. OD, ½ in. wall tube tap-10 in. run	1	31.4	31.40
T-Connector for 6 in. EHPS tube run to 10 in. OD, ½ in. wall tube tap-6 in. run	1	45.8	45.80
T-Connectors for 10 in. OD, ½ in. wall tube run to 6 in. EHPS tube tap-6 in. tap	4	20.8	83.20
T-Connectors for 10 in. OD, ½ in. wall tube run to 6 in. EHPS tube tap-10 in. run	4	49.4	197.60
T-Connectors for 10 in. OD, ½ in. wall tube run to 10 in. OD, ½ in. wall tube tap-10 in. tap	1	31.4	31.40
T-Connectors for 10 in. OD, ½ in. wall, tube run to 10 in. OD, ½ in. wall tube tap-10 in. run	1	56.6	56.5
Corona Bell for 10 in. OD, ½ in. wall tube	3	21.4	94.20
Butt Welds for 10 in. OD, ½ in. wall tube with 8⅞ in. OD, ¼ in. wall, 6 in. long aluminum aligning sleeve	14	31.4	439.60
Flexible Connector for 10 in. OD, ½ in. wall tube to 10 in. OD, ½ in. wall tube	12	31.4	376.80
Flexible Connectors for 10 in. OD, ½ in. wall tube to 10 in. aluminum channel	3	31.4	93.20
T-Connectors for 10 in. OD, ½ in. wall tube run to 1½ in. EHPS tube tap-1½ in. tap	6	5.97	35.82
T-Connectors for 10 in. OD, ½ in. wall tube run to 1½ in. EHPS tube tap-10 in. run	6	38.4	228.40
T-Connectors for 10 in. OD, ½ in. wall tube run to No. 2 AWG copper terminal connection tap	6	18.1	114.60
Totals	127		3,443.57



Welded T-Connector (Item 6 in table)

*Brenner, Morris. *Trends in the Welding of Aluminum Bus Connections; AIEE Conference Paper 58-872.*
†*Welding data for switchyard bus will be listed in two subsequent issues of Electrical World.*



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Comparison proves dependability, efficiency, lower operating cost

When you buy General Electric's new outdoor lighting ballasts you'll be getting "bonus" features offered by no other manufacturer!

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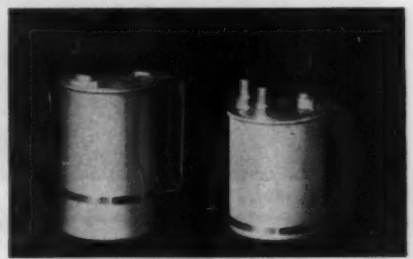
COMPARE FOR YOURSELF

	G.E.	MFR. A	MFR. B
Lamp Watts (Horiz. position)	400	368	389
Watts Loss	55	77	52
Regulation	+0 to −1½%	+2 to −2%	+1 to −1%
Crest Factor	1.5	1.8	1.6
Housing Material	Aluminum	Galvanized Steel	Galvanized Steel
Weight (lbs)	26	42	34



G-E "BONUS-LINE" BALLASTS—available in multiple and series forms—start and regulate all sizes of lamps.

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Modular Unit Is Basis of Breaker Design

R. B. SHORES and W. R. WILSON, High Voltage Switchgear Dept, General Electric Co, Philadelphia, Pa.

New design concepts for power circuit breakers offer significant savings in operating costs. Outdoor air-blast breakers are being introduced for voltage ratings of 115 kv through 460 kv. They use a modular, or building block design that offers savings to users as well as increased manufacturing standardization.

The new air-blast circuit breaker is made up of one or more columns per pole, with air stored in tanks on top of the columns at high voltage. Each storage tank contains a pair of interrupter contacts and a mechanism that operates them. The interrupters are pneumatically controlled by a central main valve. Current transformers are placed in certain breaker support columns.

These technological advances permit the introduction of airblast breakers with performance comparable with high-capacity conventional breakers:

1. Designing the interrupter and operating mechanism as a single package located inside a high pressure air storage tank at high voltage;

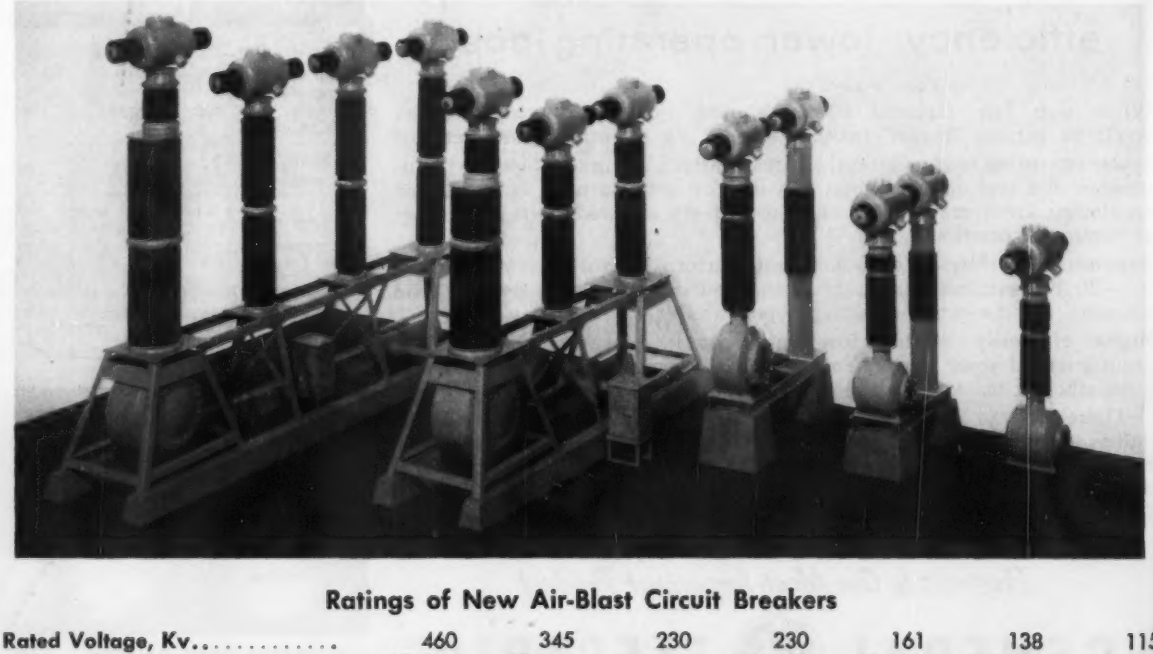
2. Incorporating gas-filled current transformers into the supporting insulator structure;

3. Insuring ability of the interrupter to handle the recovery rates encountered on high capacity systems.

Since air storage tanks are continuously pressurized, the first principle insures that high dielectric strength, high-pressure air is available at the interrupter the instant contacts part. This contributed significantly to line dropping and capacitor switching performance, as well as rapid interruption and greatly reduced arc erosion of contacts. Neither operating time nor pressure is lost in filling long passages before interruption can take place, nor is this compressed air wasted. Efficient air usage reduces the number of series interrupting elements required. Separate isolating switches, opening after parting of the main contacts, are unnecessary.

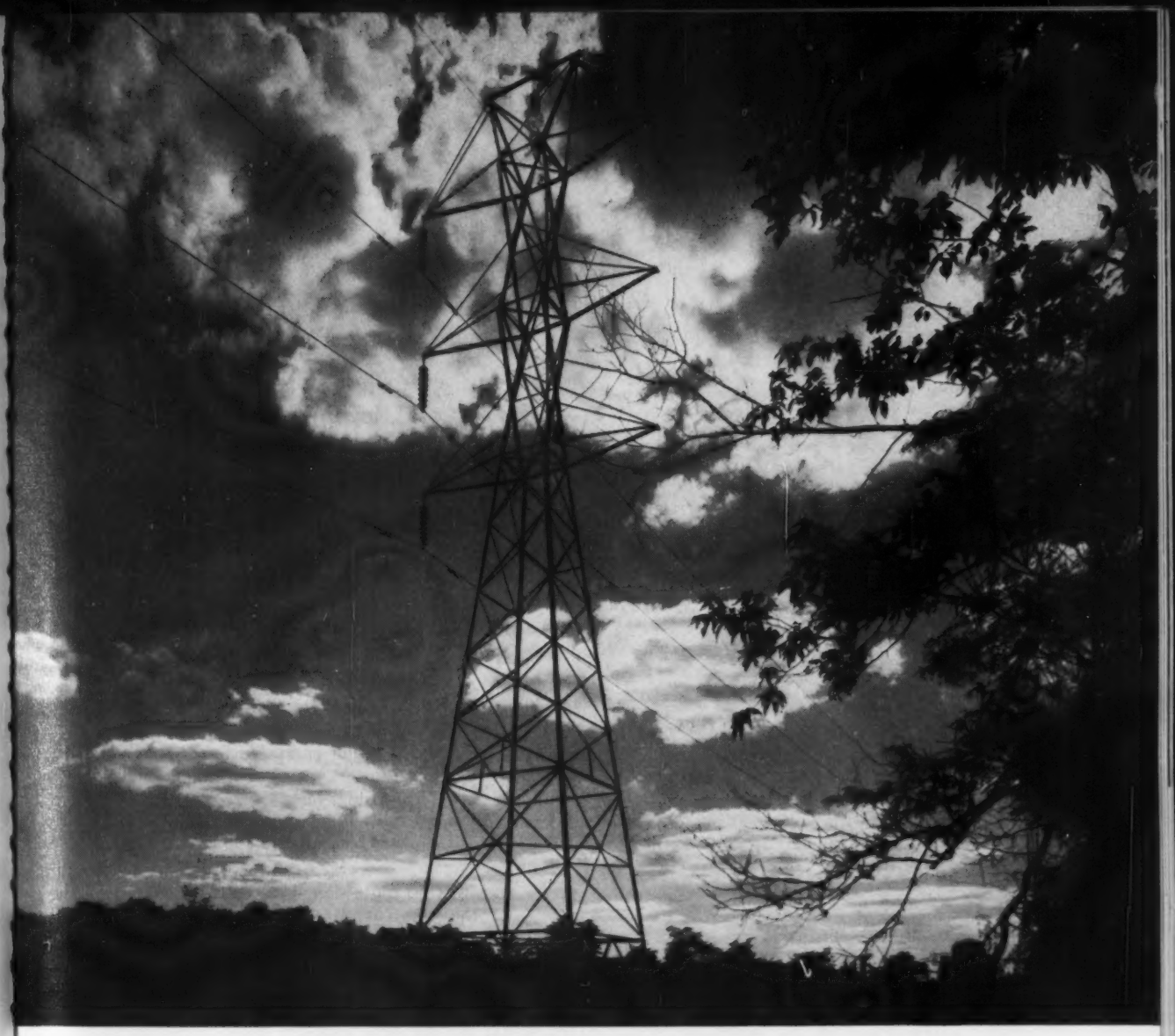
Although it has long been known that air-blast circuit breakers were sensitive to the rate of rise of recovery voltage following circuit interruption, it was only recently realized that the recovery rates caused by a transmission line fault 1½ mi from a breaker were more severe than engineers appreciated and more severe than any other known rates. A resistor and auxiliary break in parallel with each main break insures that the breakers will interrupt line faults within their ratings.

Because of reduced frequency and duration of maintenance outages, system operators can reduce the number of circuits below present requirements. High pressure air can be drained from breakers in minutes during maintenance. Arc erosion points can be inspected by opening cover plates, and the interrupter and mechanism unit replaced if necessary. With cover plates replaced, air tanks can be immediately recharged and the equipment returned to service.



Ratings of New Air-Blast Circuit Breakers

Rated Voltage, Kv	460	345	230	230	161	138	115
3-Phase Interr. Mva	35,000	25,000	20,000	15,000	10,000	10,000	10,000
No. Unit Modules per Phase	4	3	2	2	2	1	1
Net Weight, Lb	69,000	54,000	32,000	32,000	28,000	19,000	18,000



Blaw-Knox Double Circuit Tower — first circuit installed; built-in provision for second circuit when needed

To expand an existing line . . . to build a new line . . .

they chose BLAW-KNOX TOWERS

To feed the output of a new unit at the Picway Generating Station into their 138 kv system and to meet the demand in a growing residential area, Columbus and Southern Ohio Electric Company approved construction of two new transmission lines. For both lines, they chose Blaw-Knox towers.

The 138 kv line from the Picway Generating Station to Harrison Switching Station, a distance of one mile, required one 100′ single circuit tower and five double circuit towers varying from 50′ to 95′ in height.

The 10 mile, 138 kv line from Wilson Road to Bethel Road Substations is carried on 50 double circuit towers from 50′ to 85′ in height.

For more than 40 years, Blaw-Knox has worked closely with Electric Utilities in designing and fabricating towers for every type of transmission system. From this experience have evolved basic designs combining maximum structural advantages and ease of erection with unique allowances for custom modification. The performance record of Blaw-Knox Towers assures you . . .

- **towers custom designed to best meet your individual requirements**
- **high quality fabrication for easy field erection**

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Pittsburgh 38, Pennsylvania

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TRANSMISSION TOWERS—Steel Transmission towers, custom-built for each installation . . . multi-circuit and other special structures . . . and antenna towers, guyed and self-supporting types for AM • FM • TV • microwave • communications • radar

23-Kv Distribution Proves Attractive

Experience of Carolina P&L over 14 years shows improved economy, continuity, regulation, and fewer tree problems on lines

STRAIGHT-LINE POLE is replaced by 5-ft taller pole for 23-kv line which is being worked hot by linemen. Originally men were chary about working on lines at this voltage

E. M. GEDDIE, Assistant Superintendent of Lines, Carolina Power & Light Co, Raleigh, N. C.

Better, more economical service is supplied by 13.2/23-kv distribution than by lower voltages. Fewer outages and problems with voltage drop and regulation have characterized Carolina Power & Light Co's experience with it over the past 14 years. It involves fewer tree problems and improves safety and appearance.

These were the benefits from expanding the use of 23-kv distribution since 1945. In December, 1958, the company had about 3,600 miles of it in 95 feeders serving a load of 335 Mva. The lines are in rural, suburban, and urban areas, the largest city served being Wilmington, N. C., with a population of 55,000.

Not More Dangerous

Load on rural feeders varies from 3 to 5 Mva; on urban feeders up to 13 Mva. Feeders are supplied from 26 ground-type 110-23-kv substations, 3.75 to 30 Mva, having 70 oil circuit breakers. Each OCB protects 4 to 60 miles of line. Pole-top reclosers protect 18 to 185 miles per feeder in rural areas.

Fault currents at substations vary from 2,500 to 7,800 amp for 3-phase faults and from 2,500 to 6,000 amp for phase-to-phase faults. To reduce the latter, some substations have neutral reactors.

The most difficult problem with 23-kv distribution was the fear of servicemen and linemen. This voltage is twice what they had been previously called to work upon. No one in the company had the experience that would have assured them that the new voltage was not more dangerous than 12 kv.

Safety meeting discussion always got around to it. Men wanted to know what to do in rainy weather when opening or closing cutouts or installing and removing hot-line clamps on an energized line. They wanted to know whether to use longer hot sticks. Some requested that the safety manual include rules governing the conditions under which men should attempt to operate 23-kv distribution.

Managers, servicemen, and linemen were told that 23 kv was no more dangerous than the 12 kv, if they used the same care. The company explained that hazards in construction and operating jobs are associated with clearances and protection, not with line voltage. After several months of experience, most men were satisfied that 23 kv could be operated in the usual manner and with the same degree of safety as 12 kv.

Some problems were experienced with the design, but these were not serious. Few poles and crossarms have been split by lightning, even though the ground wire terminates at the neutral. Damage to wood crossarm braces from lightning has been small. Flashovers have damaged more wood guy strains than any other wood component. For this reason, salvaged 10-in. disc insulators are now used.

Performance of 13.2-kv transformers has been satisfactory from the cost and operating viewpoints. The average annual failure rate from all causes, based on transformer years of service, is 1.50%, compared to 0.91% for 7.2-kv transformers on the 7.2/12.47-kv system. The average annual coil failure rate is 0.56% for 13.2-kv transformers, compared to 0.45% for 7.2-kv units.

One problem posed by the self-protected transformers is the difference in external gap settings of arresters of different manufacturers. It is difficult to obtain proper settings in the field. Both expulsion and valve-type 15-kv arresters are used on 23-kv distribution.

(*Continued on page* 108)

Article was adapted from a paper presented at the Southeastern Electric Exchange meeting, Roanoke, Va.

use these 8 reliable helps to pole hardware selection...

SEC PH 2

TRANSMISSION HARDWARE

Greater flexibility and economy in the design of both complex and simple wood pole structures for transmission and distribution lines. Transfers larger loads — reduces bolt slotting.

SEC PH 3

AERIAL CABLE HARDWARE

Cable suspension clamps offer a most dependable, economical and easy method of attaching cable to poles. Large area pads with integral teeth increase both vertical and longitudinal stability.

SEC PH 4

GUY AND DEAD END ATTACHMENTS

The new, improved MIF Guy Hook is the most economical and efficient attachment for thru bolt guying. Permits easy attachment of any type guy dead ending device.

SEC PH 5

TRANSFORMER MOUNTING PLATES

Better, stronger direct pole mounting of distribution transformers at less cost — quick, easy, inexpensive installation requiring no special tools; can be attached to transformer prior to field installation.

. . . they are the eight product group sections of the new MIF Pole Line Hardware Catalog — each section a complete catalog in itself.

SEC PH 6

GUY CLAMPS

Greater holding power per dollar. "Come-along" action type clamp can be installed in seconds without disassembling it. Accommodates a wide range of strand sizes.

SEC PH 7

GAINS — CROSSARM AND GRID

Crossarm Gains eliminate expensive cut gains on pole, increase stability, reduce possibility of rot and pole fires. Grid Gains strengthen single bolt connections, distribute loads over large wood areas.

SEC PH 8

WASHERS

MIF Washers give greater strength on a comparative weight basis, and added resistance to corrosion. All are of reinforced boss and rib design to put metal where strength requirements dictate.

MIF

POLE HARDWARE DIVISION

Malleable Iron Fittings Company

BRANFORD • CONNECTICUT

Research, Engineering, Manufacturing for over 100 years

SEC PH 9

MISCELLANEOUS POLE HARDWARE

Pole Top Bracket for use with post type insulators. Timber Connectors to reduce slotting. Guy Strand Holders for safe handling of strands. Pole Mounts in 5 sizes.

VERTICAL ANGLE in a 23-kv distribution line is made in such a way that tree problems are not important factor

TYPICAL INSTALLATION of 22-kv, 3-phase transformers on Carolina Power & Light Co rural 23-kv distribution line

Operating record of the latter has been better. Although arresters have failed on the 23-kv system, the failure rate was not excessive.

The first 23-kv reclosers were installed in 1949. As of December, 1958, there were 213 100-amp, single-phase reclosers in service, varying in duty from 15 to 70 amp. Their service record is comparable to that on the 12-kv system, only two bushings having failed during 1957. Eight reclosers were replaced due to excessive friction, but all were returned to service after repairs. Part of the voltage regulation on the 23-kv system is provided by 12 50-amp and six 100-amp single-phase, 14.4-kv regulators. They are wye-connected and have given no trouble.

Outages Fewer

There are 192 25-kvar, 13.2-kv capacitors installed. Most are switched banks, using the same single-phase, 14.4-kv oil switches used on the 12-kv system. On the 23-kv banks, however, the switches are on the neutral side of the capacitors, and one bushing is grounded (EW, Oct. 14, 1957, p 100).

Cutouts on the 23-kv system—the standard 15-kv open-type drop-out—gave little trouble, even in use on 3-phase transformer installations and for 3-phase sectionalizing. These cutouts on stand-off insulators proved satisfactory in contaminated areas.

Joint-use construction with telephone companies has been the same as with distribution at other voltages. In fact, the telephone companies are probably better off with the more positive relaying.

Considering all aspects, experience indicates that service compares favorably with that of the older lower-voltage systems. Managers say that they have less trouble and fewer outages on the lines after reconditioning and conversion and that radio and television interference is no more—and sometimes less—than on the lower-voltage lines. Improper construction, such as dead-end assemblies lacking proper tension, or unbonded hardware close to other hardware or grounds, accounted for most reported radio troubles.

Tree Problems Fewer

Experience also indicated that 23-kv distribution poses fewer tree problems, even though the same rights-of-way and tree clearances are required as for lower voltages. As fewer feeders carry the load, they can be located more easily on clear streets, single-phase laterals extending down cross streets. The new distribution is safer because relaying is more positive and only one primary circuit is on each pole. Hazards are reduced as workmen are below the primary and use hot sticks.

The line is clean-cut, having not more than one cross-arm and smaller conductors. Most pressure to force lines underground is due to the appearance of large weatherproof low-voltage primary conductors.

Higher Voltage Possible

Although experience with 23-kv distribution has been good, it has not been trouble free. As with any new system or equipment, troubles not anticipated on the design board have shown up. These have resulted in changes in some specifications, and other changes will be made at the proper time to improve service to customers even further.

When demands increase beyond the capacity of the 23-kv system, a higher voltage will be considered. There seems to be no voltage limit for transmission to carry the present loads economically. Why should there be a limit on distribution?

GET GOLD SEAL RUBBER TAPE *for easy handling and instant fusing*

Here's the tape for high voltage insulation! Easy to work with, Gold Seal Rubber Tape fuses together instantly, provides long-life insulation protection. With its high dielectric strength and ability to conform to irregular shapes, Gold Seal makes a perfect insulating splice. Jenkins Bros., Rubber Division, 100 Park Avenue, New York 17.

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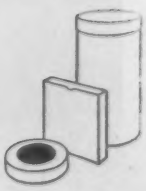
Commercial and Specification Grades



In 10-roll containers or single rolls. Each roll sealed in cellophane, stays fresh.

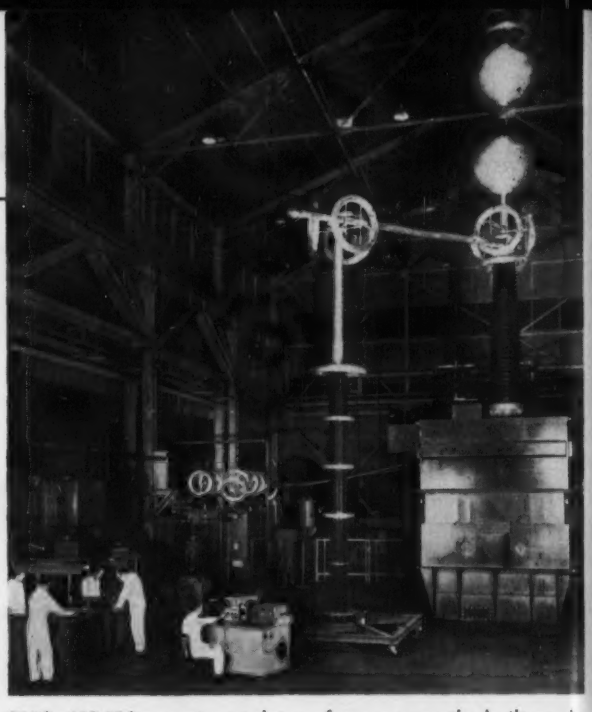
Manufacturers News

Suppliers Share Costs of 460-Kv Test Line

As utilities close in on the gray areas of extra-high-voltage transmission design and operation, they will find it increasingly convenient to obtain needed prototype apparatus "on loan" or "on consignment" from interested manufacturers. This way, they cut research costs and release funds for the ultimate heavy investment in full-size apparatus which capitalizes on test findings.

The case of Pennsylvania Electric Co's 13-mile 460-kv line is a timely illustration of this point. (EW, April 13, p 67). This prototype line with all its associated transformers, switchgear, arresters, conductors, insulators, towers, and right-of-way represents an investment of $2½-3 million. Penelec will put up half of this, mostly for right-of-way and construction; the associated manufacturers will foot the rest of the bill by lending their equipment to Penelec.

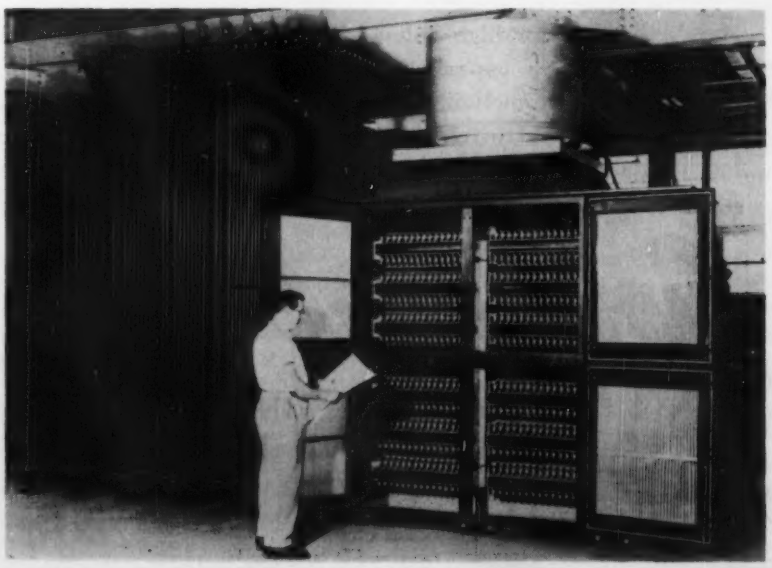
Louis H. Roddis, Jr, Penelec's president, explains the situation this way. The test apparatus—for instance, transformers rated 40,000 to 50,000 kva—is scarcely large enough for the ultimate needs of a long line, which would probably require 300,000-kva units. Thus, this apparatus would be useful only for the period of the test, and outright purchase might tie up funds needed to finance the ultimate project. Manufacturers, equally interested in test findings, find it prudent to loan the necessary apparatus.



THIS 460-KV experimental transformer recently built and tested in Pennsylvania Transformer Co's plant is pattern for transformers the company will lend for Penelec's line

The situation is slightly different where towers, insulators, and conductors are concerned. With structures and insulation designed for an ultimate 460-kv working line, Penelec prefers to take materials on consignment for the duration of the test with an option to purchase.

I-T-E Circuit Breaker Builds 3500-Kw Silicon Rectifier

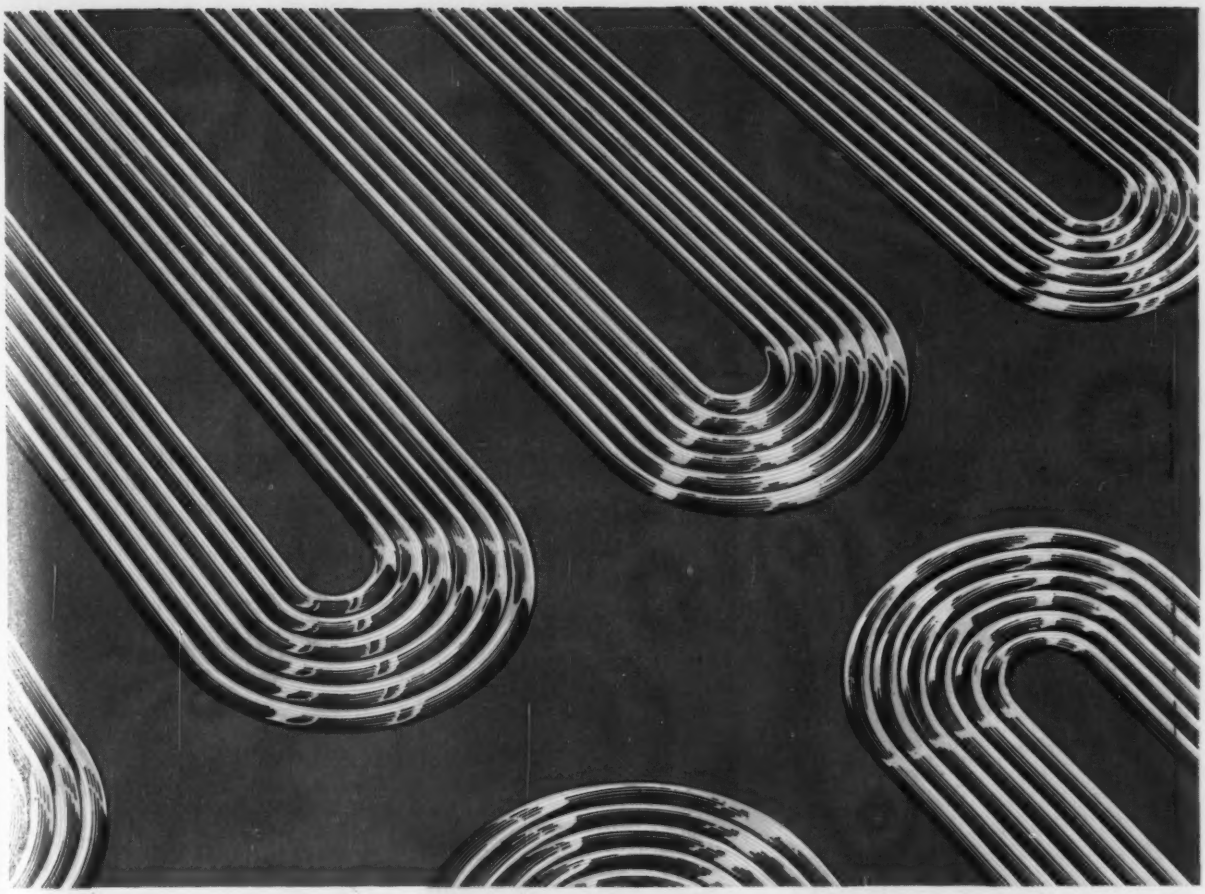


I-T-E Circuit Breaker Co is building this silicon rectifier to supply 3500 kw of direct-current power for classified research at University of California's Los Alamos Scientific Laboratory.

Four 125-v rectifier sections comprising the unit can be connected in series-parallel combinations to supply full power at 500, 250, and 125 v.

A 12-phase transformer arrangement, I-T-E says, provides current balancing, air cooling for operation at high altitude, and low-ripple output. Input power is fed from a 13.8-kv, 3-phase, 60-cycle source. Fully weatherproofed construction is another feature of the rectifier.

(*More Manufacturers News, p* 112)



NOW! U-BEND HEAT EXCHANGER TUBES BY CHASE

save time, trouble, money . . . all these ways!

SAVE on installation costs by eliminating one tube sheet . . . halving welding or rolling-in operations.

SAVE because handling is minimized.

SAVE time, labor and equipment used to fabricate U-bend tube on the job site.

SAVE because U-bend eliminates need for floating heads by handling differential expansions.

SAVE by eliminating scrap. Tubes fabricated to specifications do away with waste-end scrap.

SAVE because pallet loading insures storage economy.

Now you can order *pre-fabricated* tubes from Chase. That means you can realize the many on-the-job advantages of U-Bend tube, and at the same time be sure of *quality*.

Chase tube is manufactured under constant production control. Relief annealing immediately after bending avoids possible stress-failure later; precision hydrostatic testing of bends detects any possible hidden defects.

Chase U-Bend tube is available in uniform gauge, as well as with thickened center. Sizes range from ⅝" o.d. to 1" o.d., bent on radii from ⅞" to 25" depending on your requirements.

When ordering, be sure to include the following information: O.D. and I.D. in inches; wall thickness; length; quantity; alloy or material; temper; bend radius; length of thickened portion on dual-gauge tubes. Talk your specific needs over today with your nearest Chase office, or write Chase at Waterbury 20, Connecticut.

Chase

BRASS & COPPER CO., WATERBURY 20, CONN.

Subsidiary of ***Kennecott Copper Corporation***

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

THE NATION'S HEADQUARTERS FOR ALUMINUM • BRASS • BRONZE • COPPER • STAINLESS STEEL

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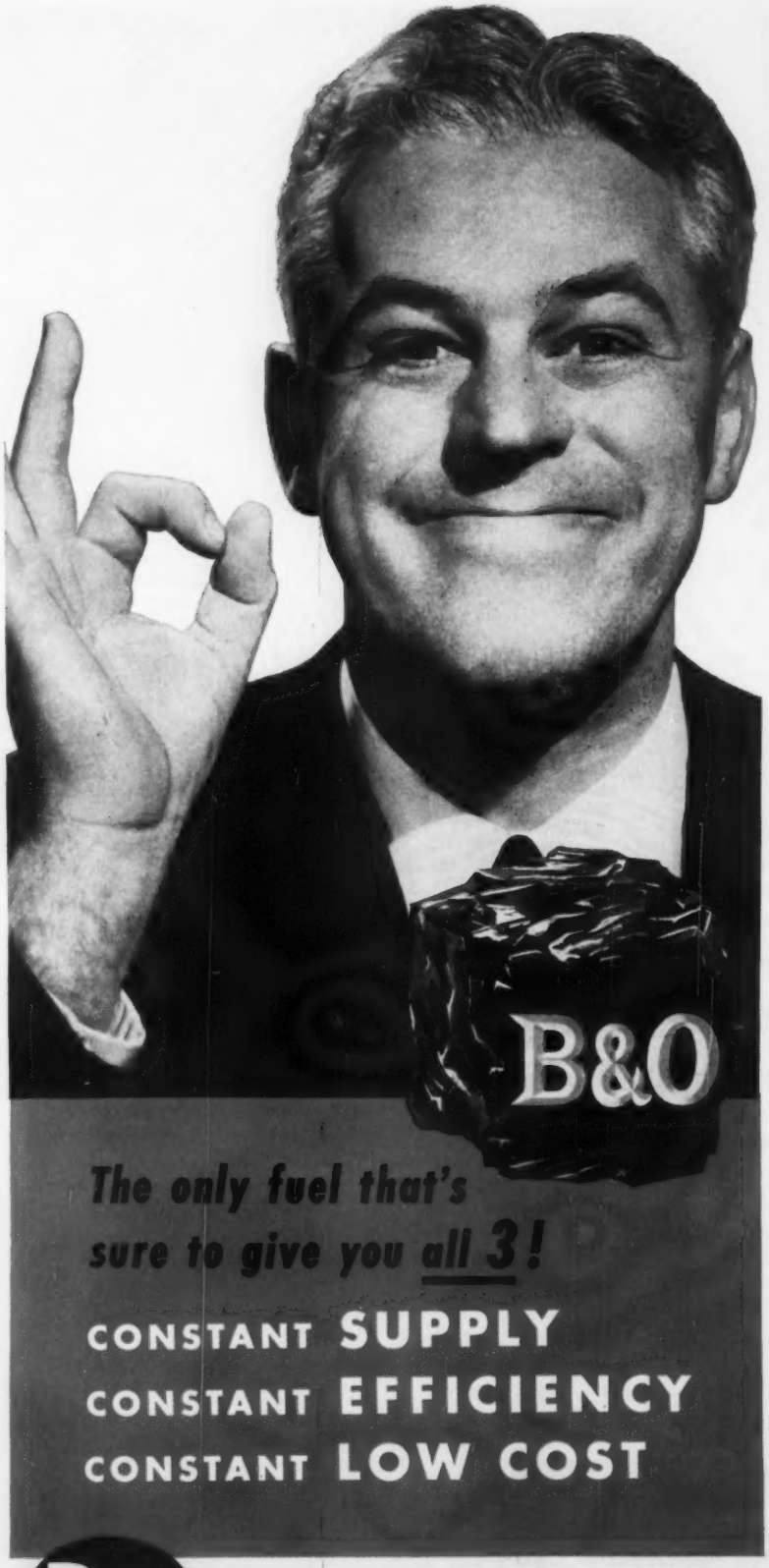
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The only fuel that's
sure to give you all 3!
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CONSTANT LOW COST
B&O
BITUMINOUS COALS FOR EVERY PURPOSE
Ask our Man! BALTIMORE & OHIO RAILROAD, BALTIMORE 1, MD. Phone LExington 9-0400

A. B. Chance Purchases Plastics Manufacturer

A. B. Chance Co strengthens its hand in the line equipment field with the purchase of a plastics manufacturer, the Starline Co of Dayton, Ohio. Products made by Starline include transformer bushing covers to prevent squirrel and bird outages and plastic cutout covers used in line maintenance work.

Starline will be operated as a wholly owned subsidiary with product sales handled by Chance's marketing division. Cyrus B. Newcomb will continue as a vice president of Starline, while other officers will be Chance executives.

North American to Buy Foster Wheeler Corp

With the acquisition of Foster Wheeler, North American Aviation will become a potentially stronger factor in the nuclear power field. Behind the merger appears to be the fact that both of these diversified companies are actively involved in the atomic power business.

North American's Atomics International Division has built nuclear power reactors, while Foster Wheeler has supplied some key components for the Navy's atomic submarines. In addition, Foster Wheeler brings North American experience in utility steam generating equipment.

The acquisition, subject to stockholder approval, involves an exchange of stock valued at about $27 million at the current market.

Air Purification System Used by PSE&G for Generators

Public Service Electric & Gas Co installed activated carbon air-purification equipment to protect the collector rings of Linden Station's generators from corrosive gases. Two Dorex installations of six cells each are employed to prevent a destructive condition which would cause frequent replacement of brushes and rings.

The Dorex equipment acts like a

(*Continued on page* 115)

Today, more and more men with maintenance on their minds will tell you . . . it's good business to protect lumber with PENTA treatment. Here's why:

1. Costs no more — Service records show PENTA treatment gives poles, cross ties and other lumber for exposed structure extra long life. Yet PENTA-treatment costs no more than ordinary preservatives.

2. Won't leach out — Because PENTA is an oil-borne rather than water-soluble preservative, it doesn't leach out, leaving wood vulnerable to rot and termites.

3. Clean to handle — Construction and maintenance supervisors know that workmen handle clean wood faster, more efficiently — and with fewer kicks!

Reichhold is a major supplier of PENTA to the wood industry and to wood users. If you haven't done so yet, investigate this modern method of protecting your lumber investments — write for the name of your nearest Reichhold distributor of PENTA.

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Hydrochloric Acid • Formaldehyde • Glycerine • Phthalic Anhydride
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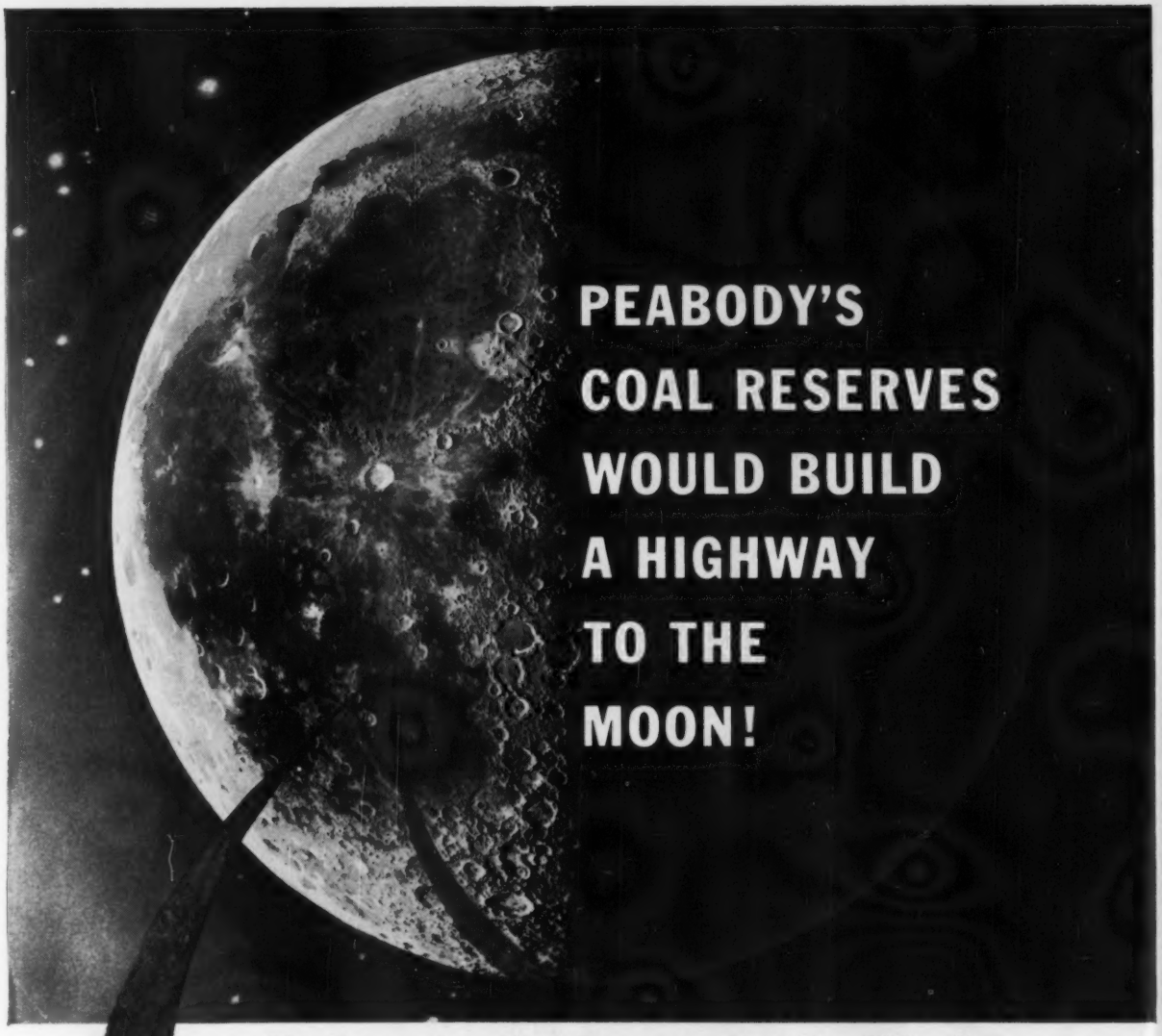
Pentaerythritol • Pentachlorophenol • Sodium Pentachlorophenate
Sulfuric Acid • Methanol

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y.

Creative Chemistry . . . . . Your Partner in Progress



PEABODY'S COAL RESERVES WOULD BUILD A HIGHWAY TO THE MOON!

This Tremendous Coal Reserve . . . Over Two Billion Tons . . . Is Your Assurance of a Dependable Source of Fuel

Peabody's Coal Reserves are large enough to build a highway to the moon . . . 40 feet wide and 1 foot thick. They could light and power Chicago for 200 years or power all of New York City's television sets for 1,644 years. That is a *lot* of coal . . . it is a dependable source for you. These vast reserves . . . strategically located near the nation's inland waterways . . . plus Peabody's knowledge of low-cost production . . . are your assurance of an economical supply of coal for years to come. And at Peabody mines, coal is tailor-made to get maximum efficiency from your burning equipment. Your nearest Peabody representative can give you complete details.

Now available . . . the Peabody Coal Company 1958 Annual Report. Write for your copy today! Department EW.

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GENERAL OFFICES: PEABODY PLAZA, ST. LOUIS. OFFICES IN: CHICAGO, DES MOINES, KANSAS CITY, LOUISVILLE, MEMPHIS, MINNEAPOLIS, NASHVILLE

Air Purification System

(*Continued from page* 112)

gas mask by using activated carbon to adsorb destructive air-entrained pollutants, thus purging and purifying contaminated air. This is said to provide at least 95% protection efficiency against such gases as sulfur components, organic peroxides, nitrogen oxides, and chlorides.

Dorex is a product of Connor Engineering Corp, Danbury, Conn.

Fluorescent Lamp Designs Initiated by Westinghouse

New fluorescent lamp designs developed by Westinghouse are demonstrated here by one of their research scientists. Lamps, in different shapes and sizes, have bases at only one end, are connected to a single socket.

A second innovation is the U-shaped lamp, which also is single-ended and which lends itself to decorative lighting. Uses which the company foresees are street lighting, showcase lighting, signs and displays, for schools, for unusual effects in lounges, reception rooms, halls and lobbies, and for installation above diffusing plastic or glass ceilings.

New GE Test Reactor Gets Gas-Cooled Loop

An extensive gas-cooled loop system will soon be operating in the new 30,000-thermal-kilowatt Gen-

(*Continued on page* 117)

Subox Has a Paint For Every Need

If it's a steel tower, for power transmission or any other purpose, there are Subox paints for every protective and decorative requirement.

SUBOX are the only paints in the United States made with *suboxide of lead*. After drying, Subox continues to be chemically active to form a strong, impervious film. A single coat of Subox usually lasts five to eight years even under severe weather conditions.

SUBOX "600" SERIES contains an epoxy resin for increased chemical, alkali and water resistance. Gives added protection against corrosive fumes and extremes in temperature changes.

GALVANOX, with a high content of special metallic zinc, provides an electro-chemical type of protection. Not to be confused with ordinary zinc oxide paints, it is superior for reconditioning damaged galvanized surfaces.

AEROX is the name used to distinguish the orange and white Subox-made paint used for towers near airfields. It holds its brilliant visibility well under all conditions.

Write today for descriptive literature and color card.

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Subox Inc.

Established 1924

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Subox Company of Canada, Weston, Toronto 15

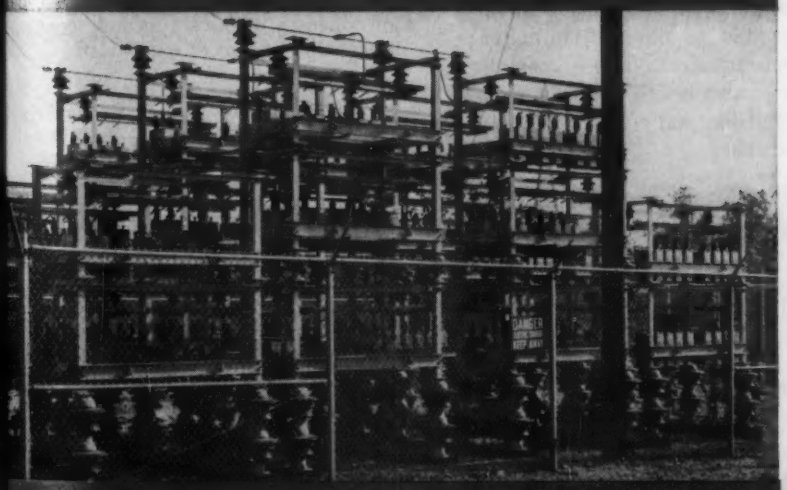
creative engineering

TOBE DOESN'T JUST MAKE CAPACITORS... Tobe creates capacitors—through research, factory-supervised field attention, and design and quality control innovations—to solve specific capacitor-design problems. And Tobe solutions are often outstanding examples of capacitor engineering progress through which the entire industry benefits.

Consider, for example, the problem engineers faced in the building of a power substation near the tip of Long Island. Practically in the Atlantic Ocean, capacitors at this installation are subject to the corrosive attacks of salt-water spray, intense sun, and flying sand. But Tobe capacitors, with such features as stainless steel cases, self-locking neoprene terminal caps, and vibration-proof, concave washers on line hardware, stand up to the elements. They take abuse and keep on working dependably because they are created to last.

You may never be faced with this problem. But the same "creative engineering in action" is yours to call upon, whether you need capacitors for power-factor correction or for the generation of a sine wave in a "hot-shot" wind tunnel. Talk to Tobe today for the answer to your problem. TOBE DEUTSCHMANN CORP., Norwood, Mass.

in action



TOBE TEMPALL CAPACITORS

...ility, persistent overvoltage, transmitting overvoltage, light protection, standard...

New GE Test Reactor

(*Continued from page* 115)

eral Electric Test Reactor(GETR) to determine the behavior of stainless steel clad uranium dioxide fuels under gas-cooled reactor conditions. The special helium-filled loops will be used in a test being conducted by Oak Ridge National Laboratory for the gas-cooled reactor program of the AEC.

The GETR, which recently went to full power at Vallecitos Atomic Laboratory, also contains a boiling water loop and a pressurized-water loop, used in GE's nuclear research and development programs.

Fuel specimens, manufactured to Oak Ridge National Laboratory specifications by GE's fuel manufacturing facility, will be tested in the new gas-cooled loop system which is scheduled for initial operation in the GETR this month.

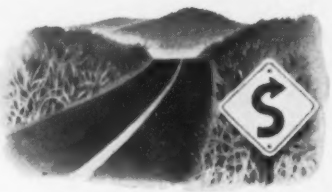
MANUFACTURERS BRIEFS

GENERAL ELECTRIC raises basic insulation levels of 50-kvar capacitors to match BIL's of single-phase, pole-top distribution transformers of the same voltage classes. Units of 2,400, 2,700, and 4,800 v have already been insulated to the system BIL for their voltage classes; all other 50-kvar capacitors up to 14,400 v will be affected by the change. A new kraft paper and new process using it as capacitor case insulation make the higher BIL ratings possible at no increase in price . . . **ALUMINUM CO OF AMERICA** announces that acquisition of Rome Cable as wholly owned subsidiary is official. The two companies will combine electrical conductor, conduit, and accessory activities. According to R. V. Davies, Alcoa's vp-sales, Rome management officials will continue in same capacities under Alcoa . . . **WESTINGHOUSE** will build a large warehouse in Columbus, Ohio, to serve as a major supply depot and inventory service center. Initially, it will function as distributor outlet to points east of the Rockies for consumer products; later also for apparatus and general products . . . **CHASE-SHAWMUT** is adding

(*Continued on page* 118)

Whatever your brush problem

Line?



Roadside?

Right-of-way?

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With the right background—Chemical control of weeds and brush has developed along established lines of procedures and practices. Amchem initially pioneered the major advances in the field, has originated many of today's accepted procedures and products for efficient, economical weed and brush control. Your problems are in *experienced* hands when you hand them to Amchem!

With the right approach—Amchem's corps of weed and brush specialists are basically application specialists. Combining comprehensive theoretical and practical experience they are able to offer all industry a realistic approach to *any* weed or brush problem. These specialists have developed a variety of efficient weed and brush eradication programs over thousands of miles of line, roadside and right-of-way areas once choked and inoperable due to infestation.

With the right product—Amchem's tremendously diversified product line is your assurance that the right weed and brush killer is available and will be utilized for your specific problem. Weedone Brush Killers, for example, have been used in the field for years and proven eminently successful in eliminating weeds and brush wherever they are a problem. Why not bring your problems to Amchem?

Amchem and Weedone are registered trademarks of Amchem Products, Inc.

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Please send me copies of your "Brush Control" brochure and full information on the uses of Weedone Brush Killers.

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WEEDONE

BRUSH KILLERS

another chemical development of
Amchem Products, Inc.
(Formerly American Chemical Paint Co.)
St. Joseph, Mo. • AMBLER, PA. • Niles, Calif.

Manufacturers Briefs

(*Continued from page* 117)

a 30,000-sq-ft fuse-making factory to its plant in Newburyport, Mass., as part of its expansion program begun about a year ago. A 25,000-sq-ft production facility was another addition . . . "Therm-O-Flex," filter-type dust-and-fume collector built by **WESTERN PRECIPITATION,** has been installed for a western steel company on two 100-ton-capacity electric arc furnaces. Operating like a vacuum cleaner, it collects smoke and fumes in 792 special bags 25 ft long and 1 ft in dia, made of silicone-treated woven glass fabric. Each bag is collapsed every half hour and material clinging to the bags drops of its own weight into hoppers, where it is removed by conveyors . . . **WESTINGHOUSE** announces near-completion of first of thirteen 167,000-kva waterwheel generators for N. Y. State Power Authority's Niagara power project . . . **I-T-E CIRCUIT BREAKER** announces completion of installation of isolated-phase bus system at the Robert Moses Powerdam. The bus carries the electrical output of all 16 of the 60,000-kva water-wheel generators to twelve single-phase, 86,000-kva step-up transformers . . . **SYLVANIA ELECTRIC PRODUCTS** introduces a 100-watt incandescent light bulb the size of a 60-watt and "offering light output of more than two 60-watt bulbs." The "Pearl White" bulb produces 5% more light than other Sylvania 100-watt lamps.

testing circuit breakers?

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Test any protective device faster with Multi-Amp! Confines instrumentation to a single enclosure, greatly reducing "set-up" time. Safe and entirely portable. Get the facts from Jim Bates by phone or mail!

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MULTI-AMP CORP. LEHIGH AVE. / UNION, N. J.
"Continuous power for continuous production"

Type MC
400 and 600 amperes

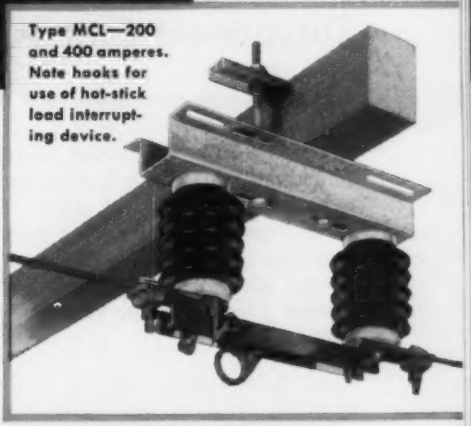
Write today for the Kearney Catalog, Section 6, on Hook Operated Disconnects

NOW

peak performance
at lowest cost with

KEARNEY

hook operated **DISCONNECTS**



Type MCL—200 and 400 amperes. Note hooks for use of hot-stick load interrupting device.

Sturdy, simplified construction of Kearney Center Bolt type Disconnect Switches offers field-proved performance with substantial cost savings. Current-carrying parts comply with all NEMA standards for heat rise and surge capacity. One-piece casting of terminal pads and contacts minimizes transfer points, reduces heat. Blades and blade lock are exceptionally strong and rigid. See and test this superior equipment—discover how *you* can get maximum performance at minimum cost.

- **Blade withstands 80 lbs. thrust at 90° to pull ring without distorting.**
- **90° blade stop in open position checks blade from falling free.**
- **Positive latch and pry-out prevent galling.**
- **Hinges carry no current, permit best mechanical design.**

JAMES R. KEARNEY CORPORATION • 4224-42 Clayton Avenue • St. Louis 10, Mo.

394

FOR BETTER CONSTRUCTION—SAFER MAINTENANCE

Specify Kearney Products

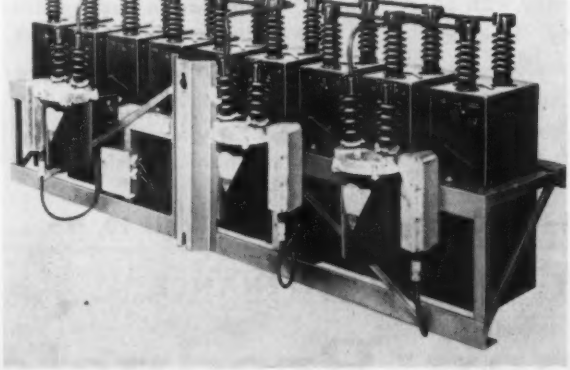
Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

Compression Connector . . .

. . . for service entrance connections is pre-insulated for speed in installation. The connector, known as the "Insulink", can splice aluminum and copper cables from No. 10 stranded through 1/0 and ACSR from No. 6 through No. 2. It consists of an aluminum sleeve, a nylon jacket and a polyethylene cap on each end. The caps grip the cable insulation securely so that the lineman has both hands free for crimping. The jacket is color-coded to show the cable sizes it will take and printed to show how far back to strip cable insulation and where to crimp.
Burndy Corp, Norwalk, Conn.

Disconnect Switch . . .

. . . is available in voltages of 5 through 69 kv in current ratings of 400, 600 and 1,200 amp. The TECO Hook Operated Disconnect Switch has an extra-large pull ring, treated with a reflecting material for ease of operation both day and night. The blade is of one-piece, square copper tubing formed to withstand the maximum side thrust. A double hook can be furnished for hot stick load interrupting devices.
Turner Electric Corp, 9510 St. Clair Ave, East St. Louis, Ill.



Capacitor Racks . . .

. . . for 100-kvar units facilitate installation of pole-mounted capacitor banks. Single-row racks can accommodate 300, 600, or 900 kvar, while cluster-type racks can accommodate 600, 900, or 1,200 kvar. Depending on kvar ratings, the racks are generally applicable on systems rated 2,400 v delta through 13,800 v multi-grounded wye. The aluminum racks can be direct-pole mounted or pole-band mounted by using an optional accessory.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

(*More New Equipment on p* 122)

Safe Way to Weather a Storm
VICTOR No. 924
25,000 lb. Suspension Insulator

UTILITY VS. FUTILITY

Ever look up Webster's definition of "utility"? Look: "1) Quality or state of being useful. 2) Power to satisfy human wants. 3) Happiness; the greatest good or happiness of the greatest number. 4) A useful thing."

In fair weather, it's easy to supply power to satisfy human wants. But the conscientious power man can get a nervous breakdown when storm or wind, snow or sleet disrupt service . . . fails to supply human wants just when they're needed most. Lightless lights, cold furnaces, silent refrigerators to say nothing of shut-down industrial plants and business firms don't help your public relations program one bit.

You can save yourself a lot of grief by using VICTOR Suspension Insulators. They're designed right. They're made right. They're rigorously tested with the industry's most modern testing equipment. Specify VICTOR Suspensions for *your* lines. It's a safe way to assure continuity of service in times of emergency.

BAPTISM OF FIRE

Every VICTOR Suspension shell receives a "baptism of fire" to make sure it measures up to VICTOR standards of quality and performance. After Suspension shells come from the kilns, every one is individually subjected to high voltage flashover tests on a VICTOR-designed continuous tester. Each must stand up under these electrical tests before being eligible for assembly. After assembly, each completed insulator unit is mechanically pulled *and* again subjected to electrical test, this time to high frequency and 60-cycle flashover. These stringent, individual tests mean greatest assurance of continuous performance—greatest possible protection for your lines.

OLE DAN'L BOONE HAD NOTHING ON US!

We've done a bit of pioneering, too. Not so long ago, either, although a lot of history lies behind the whole thing. You see, the demand for VICTOR insulators has been increasing through the years. At first, we kept abreast of demand by increasing manufacturing facilities. We were still hard pressed to supply the demand. Main bottleneck was the time required for air drying to evaporate enough moisture to permit insulators to be released from their molds for finishing, glazing and firing. Then one of our slide-rule boys came up with an idea. Why not dry the insulators in their molds by means of infra-red heat? As a result of that idea, we started experimentation and built the first continuous infra-red mold release dryer in the industry. By enabling us to dry in minutes instead of hours, it broke our production bottleneck. Improved service to our customers, too.

PUTTING THE SKIN ON THE SAUSAGE

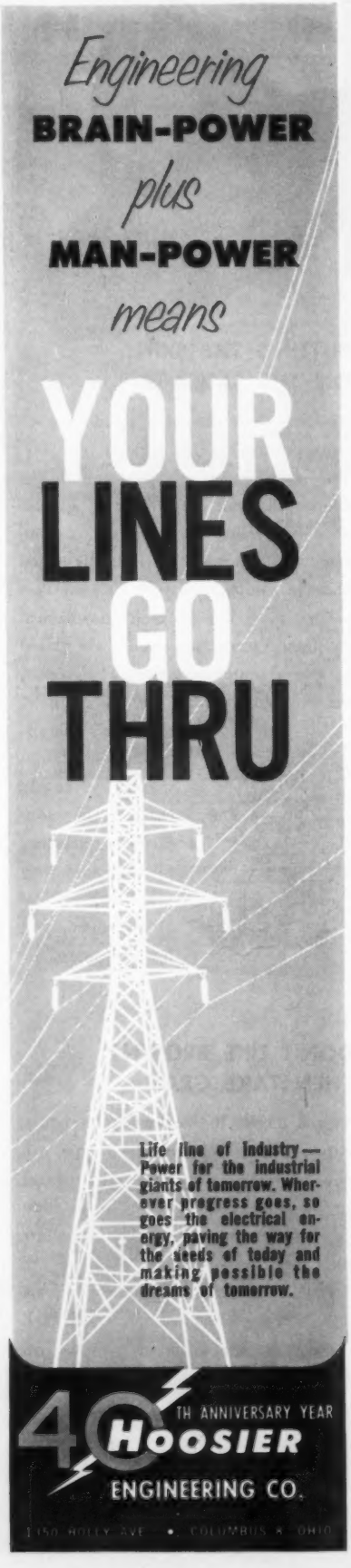
An insulator needs a skin, too, before it's ready to take up its duties on your line. That skin is glaze. Glaze is a glass-like coating that not only improves appearance but resists accumulation of contaminants. VICTOR's scientifically fitted glaze in combination with *Purified* Porcelain gives extra high mechanical strength. VICTOR Suspensions are glazed in special automatic glazing machines, designed and built by VICTOR. In them, unglazed insulators on spindles automatically rotate through continuously circulating glaze, assuring glaze application of controlled, uniform thickness.

DON'T LIKE BROWN? THEN TAKE GRAY

VICTOR 25,000 lb. suspension insulators, either ball or socket or clevis type, can now be had in gray glaze at no extra charge. When ordering, be sure to indicate catalog number and color of glaze desired.

For full information and engineering data on VICTOR Suspensions, write I-T-E Circuit Breaker Company, Victor Insulators Division, Victor, N.Y.

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION


Engineering
BRAIN-POWER
plus
MAN-POWER
means
YOUR LINES GO THRU
Life line of industry—Power for the industrial giants of tomorrow. Wherever progress goes, so goes the electrical energy, paving the way for the needs of today and making possible the dreams of tomorrow.
40TH ANNIVERSARY YEAR
HOOSIER
ENGINEERING CO.
1150 HOLLY AVE • COLUMBUS 8, OHIO

Dielectric Test Set . . .

. . . has maximum output of 5 ma at voltages up to 2,500 v. It may be used for step-voltage resistance tests, voltage withstand, breakdown, and 1-min resistance tests on insulation in equipment in the 300, 600 and 2,500-v classes. It is designed for testing rotating machinery, dry-type transformers, switchgear, capacitors, insulators and wiring installations. Both portable and bench models are available.
James G. Biddle Co, 1316 Arch St, Philadelphia 7, Pa.

Open Cutout . . .

. . . for distribution voltages of 14.4 to 24.9 kv and wye systems up to 34.5 kv is now available. Known as Type CDX, the cutout accommodates wire sizes up to 1/0 stranded ACSR. A non-ferrous, single-insulator, crossarm-mounting type, it is supplied with a solid cap on the fuseholder and interrupts 2,000 amp. With an expendable cap on the fuseholder, the unit interrupts 6,000 amp.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

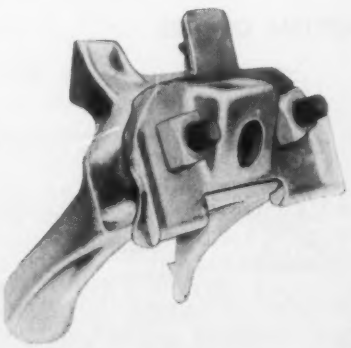
Climbers . . .

. . . with replaceable gaffs are adjustable for maximum safety and comfort. The gaff is held in position by a self-locking screw, and full impact when climbing is absorbed by the gaff and leg iron. Climbers are adjustable from 14½ to 19 in. They are available in two styles: No. 1958-AR with triangular

ring at ankle, and No. 1959-AR with riveted ankle loop.
Mathias Klein & Sons, 7200 McCormick Rd, Chicago 45, Ill.

Armor-Rod Wrench . . .

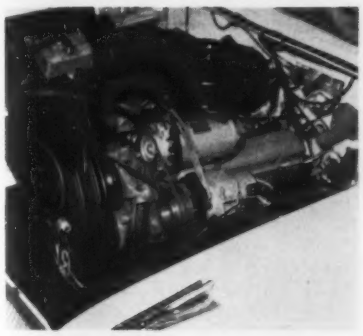
. . . and series of dies apply armor rods and line guard to conductors in sizes from No. 6 solid copper to 266.8 MCM ACSR. The wrench is made from aluminum alloy and the dies from bronze.
A. B. Chance Co, Centralia, Mo.



Aerial Cable Clamps . . .

. . . economically attach cable to wood poles. The MIF Aerial Cable Suspension Clamps have two basic pieces—spacer body and clamp plate. Large pole contacting sur-

faces of spacer body resist sinking into soft poles, maintaining adequate clearance from surface of pole to cable. Spurs on the pads resist vertical movement. Three sizes comprise the line.
Malleable Iron Fittings Co, Branford, Conn.



Generator . . .

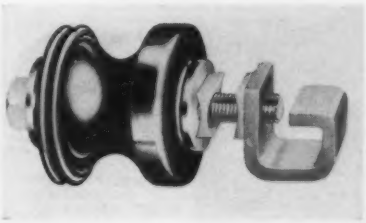
. . . mounts above a standard truck generator to provide a power source for hand tools and auxiliary equipment. The unit, called the Combinator, provides either 60 amp dc or 1,200 w of 110-v 60-cps ac power. It is operated by a switch on the dash-mounted control panel.
Kurland Motors, 1134 Broadway, Denver 3, Colo.

Tower Ladders . . .

. . . are given extra strength by embedding glass fibers in the hardwood core. The HIMCO ladders are tested for a minimum 8 to 1 safety factor. Ladders are furnished in 8, 10, 12, 14, 16 and 18-ft lengths. 20-ft ladders are available on special order.
Hopfeld Industrial Mfg Co, Box 54, San Rafael, Cal.

Aerial Lift . . .

. . . has two-stage telescoping boom which extends to a height of 100 ft. An insulated fiberglass basket with dual safety controls protects two basket occupants from shock hazard. The unit mounts on a standard truck chassis and will hold 500 lb. It rotates 300 deg and will raise 75 deg from the horizontal.
Truck Equipment Co, 3963 Walnut St, Denver 5, Colo.



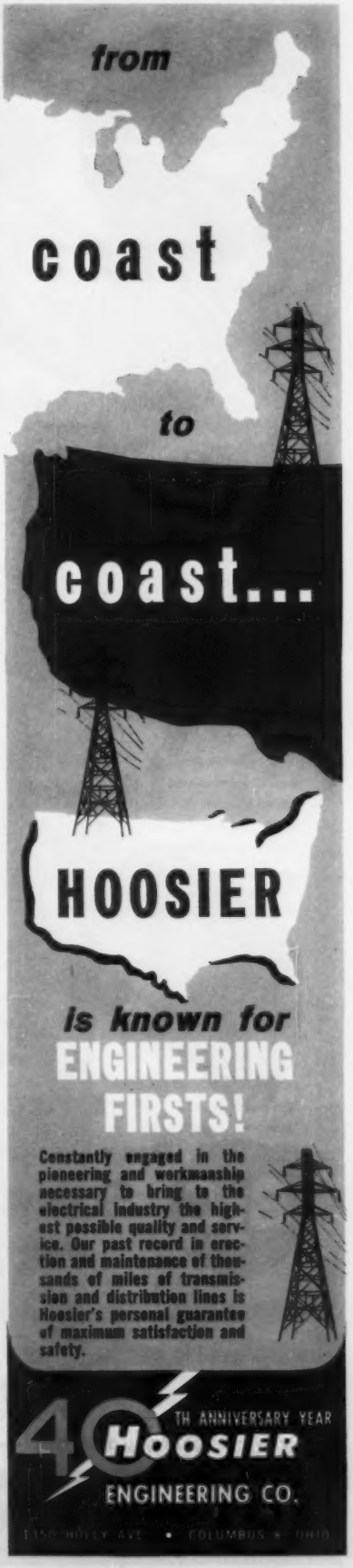
Lead Bracket . . .

. . . is attached to the bottom rolled edge of all distribution-type transformer tanks. Called No. 270, the bracket consists of an insulator, bolt and clip. It acts as a support for secondary lead wires, holding them a safe distance from the tank. The bracket is furnished with two sizes of insulators.
Hubbard and Co, 200 S Michigan Ave, Chicago 4, Ill.

Pole-Type Transformers . . .

. . . are plastic coated for use in areas where environmental conditions are severe. The finish is

(*Continued on page* 124)


from
coast
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HOOSIER
is known for
ENGINEERING
FIRSTS!
Constantly engaged in the pioneering and workmanship necessary to bring to the electrical industry the highest possible quality and service. Our past record in erection and maintenance of thousands of miles of transmission and distribution lines is Hoosier's personal guarantee of maximum satisfaction and safety.
40TH ANNIVERSARY YEAR
HOOSIER
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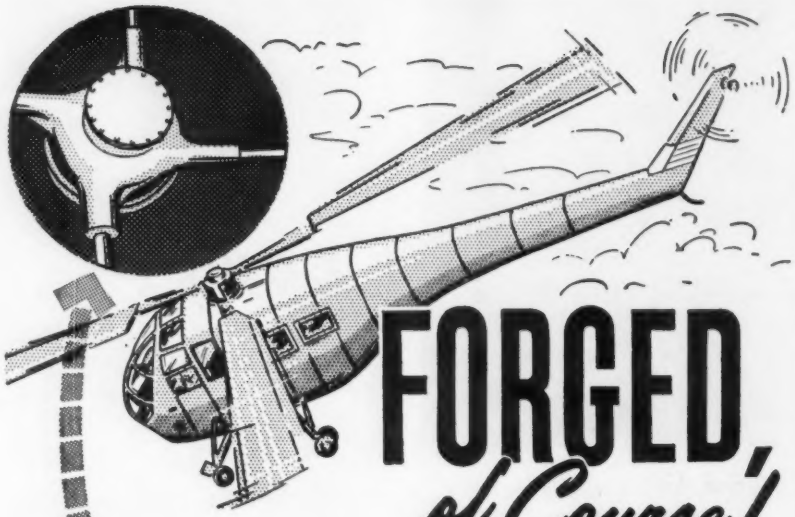


FORGED, of Course!

LIGHTER
STRONGER TOUGHER

Drop Forged Aluminum and Steel

BTC Suspension Clamps

Long Conductor Life Insurance
No excessive wear on connecting surfaces
No bore size allowance necessary
Wide range of sizes
Specify the best—BTC Hi-Line Hardware

THE BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION • CORTLAND, N.Y.

Pole-Type Transformers . . .

(*Continued from page* 123)

recommended where the atmosphere is contaminated with salt, chemical fumes, or dust and sand. **Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.**

Corrosion Inhibitor . . .

. . . for aluminum and aluminum to copper connections is now available. Known as Fargolene Fourteen, the compound is non-conductive and will not establish a potential tracking path on hot sticks or other protective equipment. The grit-bearing inhibitor maintains a workable viscosity from —20 to +350F, is water repellent, and resists wind. It is distributed by Line Material Industries, Milwaukee, Wis.
Fargo Mfg Co, 845 Main St, Poughkeepsie, N. Y.

testing directional impedance relays?

Phone Collect: MUrdock 8-7112

Test any protective device faster with Multi-Amp! Confines instrumentation to a single enclosure, greatly reducing "set-up" time. Safe and entirely portable. Get the facts from Jim Bates by phone or mail!

Planned Electrical Maintenance Program

MULTI-AMP CORP. LEHIGH AVE. / UNION, N. J.
"Continuous power for continuous production"

SPECIFY

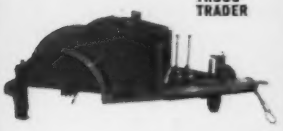
Truco

HYDRAULIC EQUIPMENT – A MODEL FOR EVERY NEED IN UTILITY CONSTRUCTION & MAINTENANCE

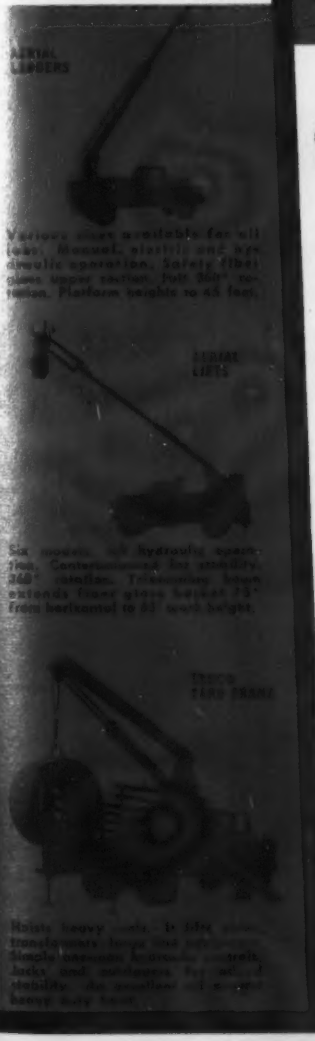
MODEL TMR-10-4 PAYOUT REEL TENSIONING TRAILER

Holds four conductor reels. Rated load capacity 10,000 pounds. Takes reels 38" wide X 54" dia. Complements TWSTR-4 to string 4 conductor lines simultaneously.

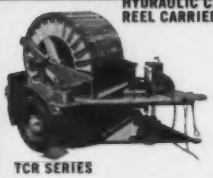
TRUCO TRADER



Hydraulic cable reel carrier chassis, less running gear. Takes axle, wheels, brakes and tires removed from tilt type trailers. Modern conversion at very low cost.



HYDRAULIC CABLE REEL CARRIERS



TCR SERIES

Safe one man operation. Loads in 6 to 8 minutes. Handles reels up to 96" dia., 60" wide, to 14,000 lbs. Raises, lowers, levels hydraulically. Four drives available.

TWT SERIES

Handles reels up to 56" dia., 36" wide, to 4,000 lbs.

MODEL TWSTR-4 ROPE WINDING TENSIONING TRAILER

Pays out, winds in 2500 feet of rope on each of 4 drums. 2,000 lbs. direct tension on each rope. Completely self-contained unit. Drums driven simultaneously. A hydramatic truck transmission drive between engine and spools assures even control.

MODEL TPWPTT-6-4 PNEUMATIC WHEEL PAYOUT TENSIONING TRAILER

Single reel tensioning trailer. Two rubber tired wheels apply tension for heavy conductor. Over 2,000 lbs. pull. One man load-unload operation without additional equipment. Capacity: 5,000 lbs. reel weight.

TRUCO PRODUCT CLASSIFICATIONS

Earth Boring Machines
Earth Drills
Front Mount Winches
Hydraulic Aerial Ladders
Hydraulic Aerial Towers
Hydraulic Derricks
Hydraulic Jacks
Hydraulic Cranes (Truck)
Jacks, Hydraulic
Ladders, Aerial and Towers
Lifts, Aerial
Pole Derricks
Post Hole Diggers
Power Winches
Revolving Aerial Ladders
Reels (Collapsible, Power)
Towers, Aerial (Hydraulic)
Trailers, Cable Reel
Trailers, Tensioning
Trailers, Utility Pole
Trailers, Wire Reel
Utility Pole Drilling Units
Wire Reel Trailers

Write or phone for full details

Truco

Ask for name of nearest distributor

TRUCK Equipment COMPANY

AComa 2-7905
3963 WALNUT ST. DENVER 5, COLORADO

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Burndy .....Connector ☐
Turner .....Switch ☐
L-M .....Racks ☐
Biddle .....Test Set ☐
Westinghouse .....Cutout ☐
Klein .....Climbers ☐
Chance .....Wrench ☐
Malleable Iron .....Clamps ☐
Kurland .....Generator ☐
Hopfeld .....Ladders ☐
Truck Equipment .....Aerial Lift ☐
Hubbard .....Lead Bracket ☐
Westinghouse .....Transformers ☐
Fargo .....Inhibitor ☐

MANUFACTURERS LITERATURE

Code No. .....

(Requests are made from code numbers on page 180).

OTHER

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

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APRIL 20, 1959

The CF&I Image assures quality

Galvanized Steel Strand

for Guy, Messenger & Ground Wires

The CF&I Image—giant symbol of dependable steel products—contributes to the ever-expanding industrial growth of America. And where telephone or utility lines spring up, you'll find the CF&I Image—for in the electrical and communications industries he stands for top-quality guy, messenger and ground wires.

To prevent pole leaning and power line sagging, use CF&I Galvanized Steel Strand. Made to customer specifications or to ASTM specifications A-122 or A-363, the steel strand is quality-controlled throughout every stage of production. That's why utilities rely on CF&I Galvanized Steel Strand to stand up under the most rugged conditions.

When you need strand, see your nearby CF&I representative or local distributor for complete details on CF&I Galvanized Steel Strand.

CF&I STEEL

GALVANIZED STEEL STRAND

THE COLORADO FUEL AND IRON CORPORATION

In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita

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CF&I OFFICE IN CANADA: Montreal • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

The "Crumble Test" proves superior heat resistance of Westinghouse Insuldur-system insulation . . . J. C. Gardner, Westinghouse network transformer representative at the Sharon, Pa., plant, demonstrates how overload and summer heat can "kill" insulation in transformers without the Insuldur system . . . while Insuldur system "stays alive."

Higher ambients, same overloads...but no heat damage

WITH WESTINGHOUSE SPACE-MISER NETWORK TRANSFORMERS

How... Insuldur system guards insulation life in Westinghouse Space-Miser network transformers

Heat is the major threat to transformer insulation life —whether from emergency overload conditions or high summer ambients.

The new Insuldur* insulation system now available in Westinghouse oil-immersed Space-Miser network transformers reduces the heat threat from both sources.

Now, higher emergency overloads can be carried without fear of shortening insulation life . . . because Westinghouse network transformers with the Insuldur system operate *safely* at temperatures up to ten degrees higher than previous safe temperature limits.

Summer heat wave problems are reduced, because load-carrying ability is assured for ambients up to ten degrees higher with the Insuldur system.

The Insuldur insulation system is a Westinghouse exclusive—no other network transformer has this positive insulation-life protection.

Westinghouse oil-immersed network transformers with the Insuldur insulation system retain dollar-saving flexibility . . . easy future change to Inerteen® should the need arise.

Ask your Westinghouse representative about the Insuldur insulation system . . . a "Bonus Value" from Westinghouse Plowback of Earnings into research.

*Trade-Mark

J-70898

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

These S&C Cutouts reduce e by shortening the arc r

As any lineman who has closed a cutout on a heavy fault knows, there's a violent blast of flame and "shrapnel." There are three ways to cut down this hazard:

1. Reduce the amount of fuse tube liner (fibre) exposed to the arc.
2. Reduce the energy of the arc.
3. Increase the bore diameter* to reduce the "muzzle velocity."

In S&C's Cutouts having interrupting ratings above 5000 amperes, all three methods are employed — together — making possible the exceptionally high interrupting ratings and at the same time reducing the violence of the blast.

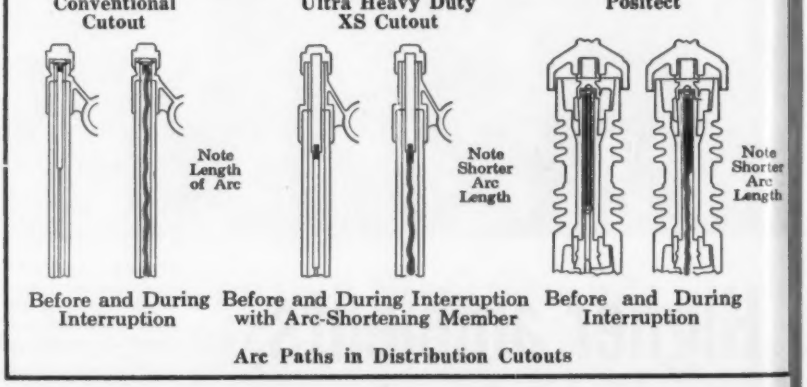
*This can be done without sacrifice of low fault interrupting capability by use of a fuse link made to interrupt low faults, in combination with a high speed terminal-separating device. In the Positect, this latter is a spring and cable assembly; in the XS, a spring-actuated cable flipper.

Here's how it's done:

The length of the arc is deliberately reduced by the use of an arc-shortening member. In the XS Cutout, this member is a husky copper rod; in the Positect, the member is a spring-and-cable assembly.

When the arc length is reduced, the arc voltage is reduced, and in turn the energy in the arc is reduced. At the same time, the arc has less fibre to act upon, and hence less gas is generated. Finally, with a somewhat larger bore in which to expand, the gases are not as violently accelerated out of the cutout's open end.

The result: less energy, less flame, less violence, and less hazard. And while such performance is of special importance at the highest fault levels, this same reduction applies proportionately across the entire range of faults.



Arc Paths in Distribution Cutouts

Ad No. 5815
Printed in U. S. A.

For voltages up to 14.4 kv

XS CUTOUTS

Open cutouts designed for use with LOADBUSTER®

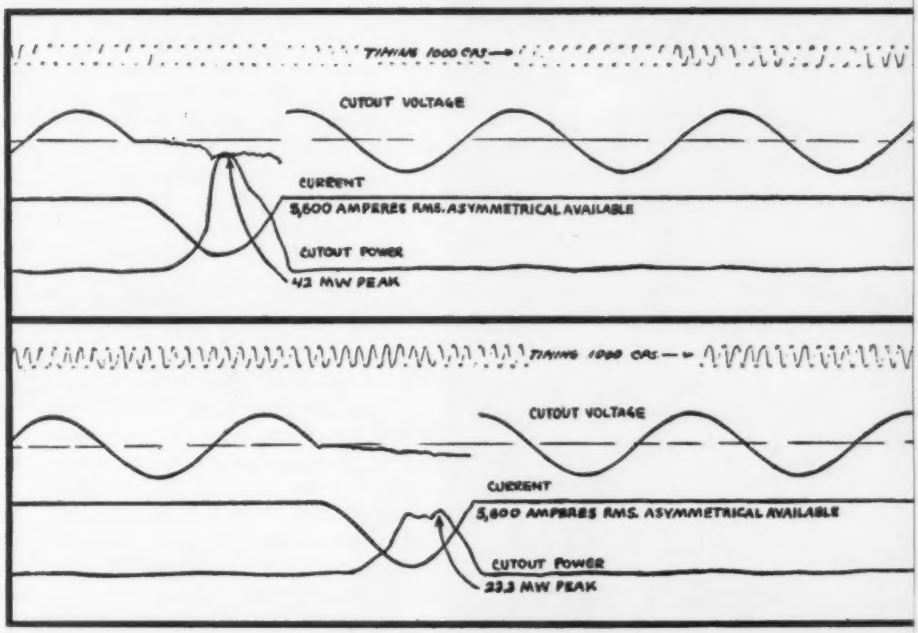
This open cutout is designed for use on modern distribution systems to provide for the two performance factors of most concern: reliable interruption of the heaviest faults with minimum violence and to provide repetitive load switching capability. Available in Extra Heavy Duty and Ultra Heavy Duty styles with arc-shortening rod at 7.2 kv and 14.4 kv. (Also Heavy Duty styles at 7.2 kv, 14.4 kv, 25 kv, and 34.5 kv.) The XS Cutout can switch full rated loads up to 200 amperes with disconnect blade at 14.4 kv when used with LOADBUSTER, the portable loadbreak tool.

exhaust blast reducing the energy

Here's the proof:

This pair of oscillograms shows how "arc-shortening" reduces the arc energy. The upper oscillogram is taken from a test on an XS Cutout *without* an arc-shortening rod; the lower is *with* an arc-shortening rod. Note that the peak power—a measure of blast violence—is virtually cut in half, from 42 megawatts without the arc-shortening rod to 23.3 megawatts with the rod. But the available fault current being handled by the arc-shortening rod is exactly the same, 5600 amps rms asymmetrical. Note also that the maximum arc voltage has been reduced 50%. This is indirectly a measure of the reduced power in the arc.

For additional information: S&C Electric Company, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



S&C

For voltages through 4.8 kv

POSITECT CUTOUTS

Enclosed cutouts with full load switching capability

The S&C Positect is the only enclosed cutout with full load switching capability, without external arc or exposed hot parts. Will switch up to 300 amperes with disconnect tube. Note interrupter attachment which permits full load switching. Designed and tested for closing against faults. In case of fault closing, all blast is directed away from operator.

Specialists in High-Voltage Circuit Interruption Since 1910

Midwest Utilities Answer Gas Light Challenge

Kansas Gas & Electric Promotes Friendship Lantern

Light-Sensitive Control, a feature available only with electric lights, is the key to a yard light promotion by the Kansas Gas & Electric Co featuring the Friendship Lantern. It is also the company's answer to the public's desire for modern yard lighting, and the current gas light craze. (The Gas Appliance Manufacturers Assn reported sales of 100,000 gas lamps during 1958.)

In the first three weeks of an all-employee campaign, which started National Electrical Week, February 8-14, 1,000 Friendship Lanterns were sold by 30% of the employees. KG&E expects to sell 5,000 in all.

Employees have been organized into 15 groups and are being offered $2 in merchandise prize awards for each lamp they sell. A $10 bonus will be paid every two weeks to the employee in each group who is tops in sales for the two-week period. The top man during the entire campaign will get an all-expense trip to Las Vegas for himself and his wife.

Promotions for the lamps include displays in Company stores, special prices to employees, advertising campaigns, and a three-month all-employee selling program. Promotions feature low operating costs as the lights are on only when needed. Installation costs are also low.

As part of the promotion, KG&E is giving a Friendship Lantern to builders for each Gold Medallion Home. When they are installed at Bronze Medallion Homes, the company charges the builder half price.

A door-to-door test program in Independence, Kan., by KG&E home lighting girls came up with these findings: Customers liked the new lights, they were ready for yard lighting, and they welcome a light that turns on and off automatically.

The Friendship Lanterns were designed by Kansas Gas & Electric. They are made by Friendship Lanterns, Inc., and distributed by Graybar Electric Co.

The lamps are attractive, add a distinctive and friendly appearance to the home, and serve as the illuminated "welcome mat" to friends and neighbors, KG&E says.

One of the Friendship Lantern's features is light bulbs of different colors for different effects.

Kansas Power & Light Pushes Its Twiliter

Photo-electric control, a feature available only with electric lights, is the key to a yard light promotion by Kansas Power & Light Co with its Twiliter yard light. The promotion features low operating costs because the lights are on only when needed, and low installation costs.

The first day KP&L's Twiliter ads appeared in newspapers, 160 lamps were sold. The company has set its first sales target at 4,000 Twiliters in three months.

Promotions include displays in company stores, campaigns with, and special prices to, employees, advertising campaigns, and special promotion with contractors.

The company offers the lamps to its employees at low WOMAC (Word-Of-Mouth Advertising Campaign) prices. The KP&L sales force and WOMAC participants will make customer contacts, but local electrical contractors will be used as primary sales outlets following the initial promotional phase.

Kansas P&L is giving free pink or green 75-w bulbs with each lamp. Lamps using these bulbs will produce an EAR of about $5 each.

The Twiliter is made by All New Products of 401 East 22nd St, Kansas City, Mo.

(*More Selling on page* 186)

count on two EXTRA measures of SERVICE from Graybar

First: Graybar provides you with an efficiency of service that can come only from long association with the utility industry. We *systematically* plan our service and stocks for *you.*

Second: Graybar people serve you with a personal extra in effort, because your system covers the area where Graybar people have their homes and business. Naturally, they share your interest fully in the progress and expansion of the utilities.

Did we say *two* extra measures of service? Well, there are several more. *Top quality products:* you are assured of maximum service on the line, minimum maintenance, and fewer interruptions of service to your customers. *Planned stocks:* our warehouse is your warehouse. (See Back Page) *Dependable delivery:* scheduled as you wish, or emergency, to help keep your customers powered for their needs.

To know this service first hand . . . call Graybar.

For leading examples of the quality electrical products distributed by Graybar . . . see the following pages.

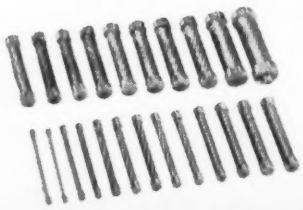
GraybaR

Everything Electrical
GraybaR ELECTRIC COMPANY
Since 1869

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • IN OVER 130 PRINCIPAL CITIES

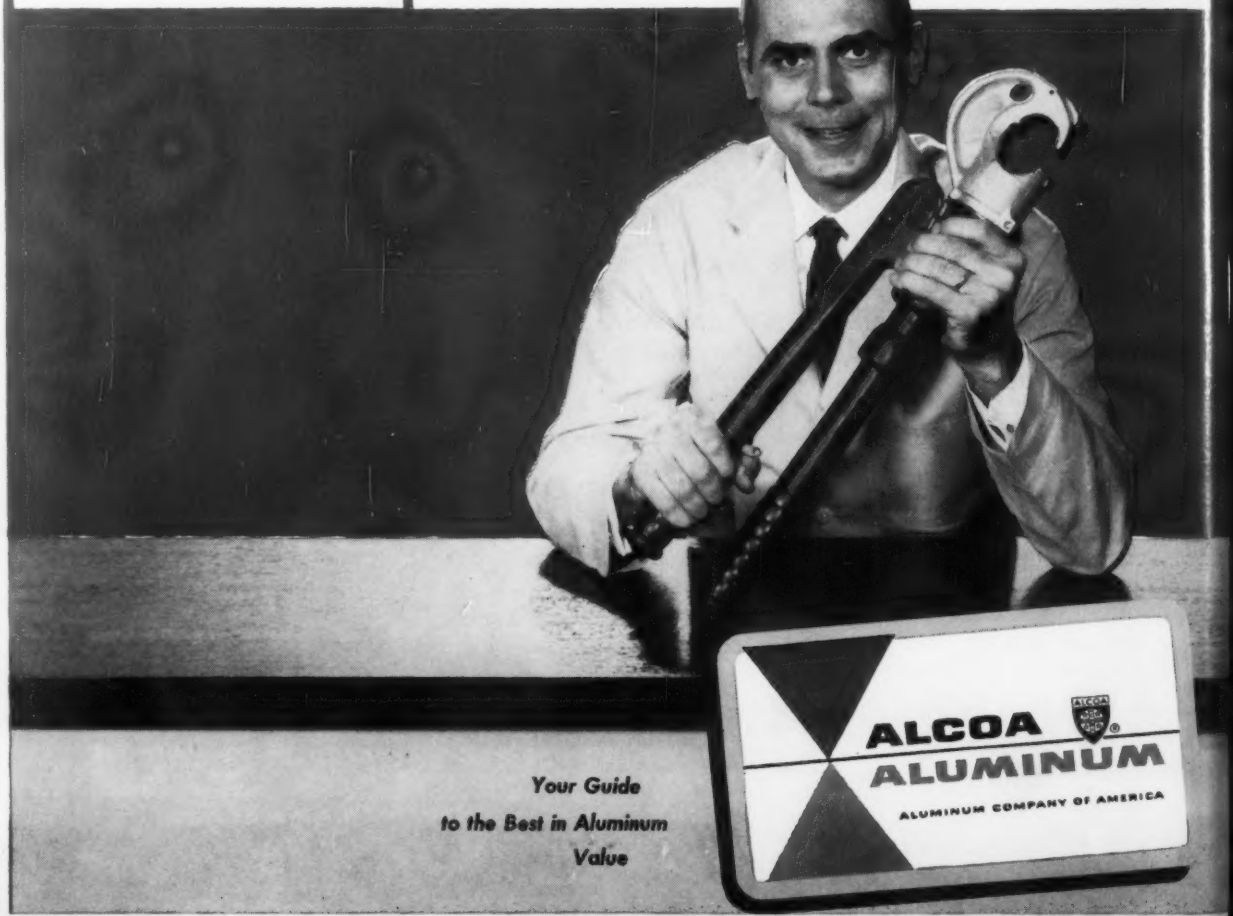
ALCOA...
GRAYBAR

ACSR and All-aluminum Conductors



Line Wire and Service Drop Cables

Tools for Applying Accessories



Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

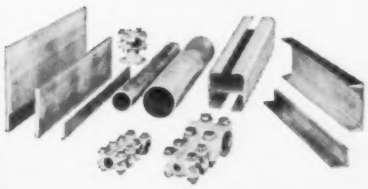
ALUMINUM COMPANY OF AMERICA

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GRAYBAR

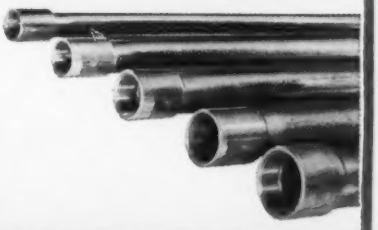
One dependable source for all your electrical conductor and accessory needs

Complete Line of Conductor Accessories

Bus Conductors



Rigid and Thin-wall Conduit



When you go to Graybar and specify Alcoa, you get the best. These two great names are teamed up to offer you:

1 *A single source* for all your aluminum conductors and aluminum accessories; undivided responsibility, less paper work, fewer problems of coordinating delivery schedules.

2 *A complete line* of aluminum conductors and aluminum accessories made for each other. Designed, engineered and produced by the world's most experienced manufacturer.

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

*Graybar QUALITY SINCE 1869 *REG U.S. PAT OFF.

Everything Electrical

*Graybar ELECTRIC COMPANY

TOP QUALITY PRODUCT

OTHER AVAILABLE FROM GRAYBAR

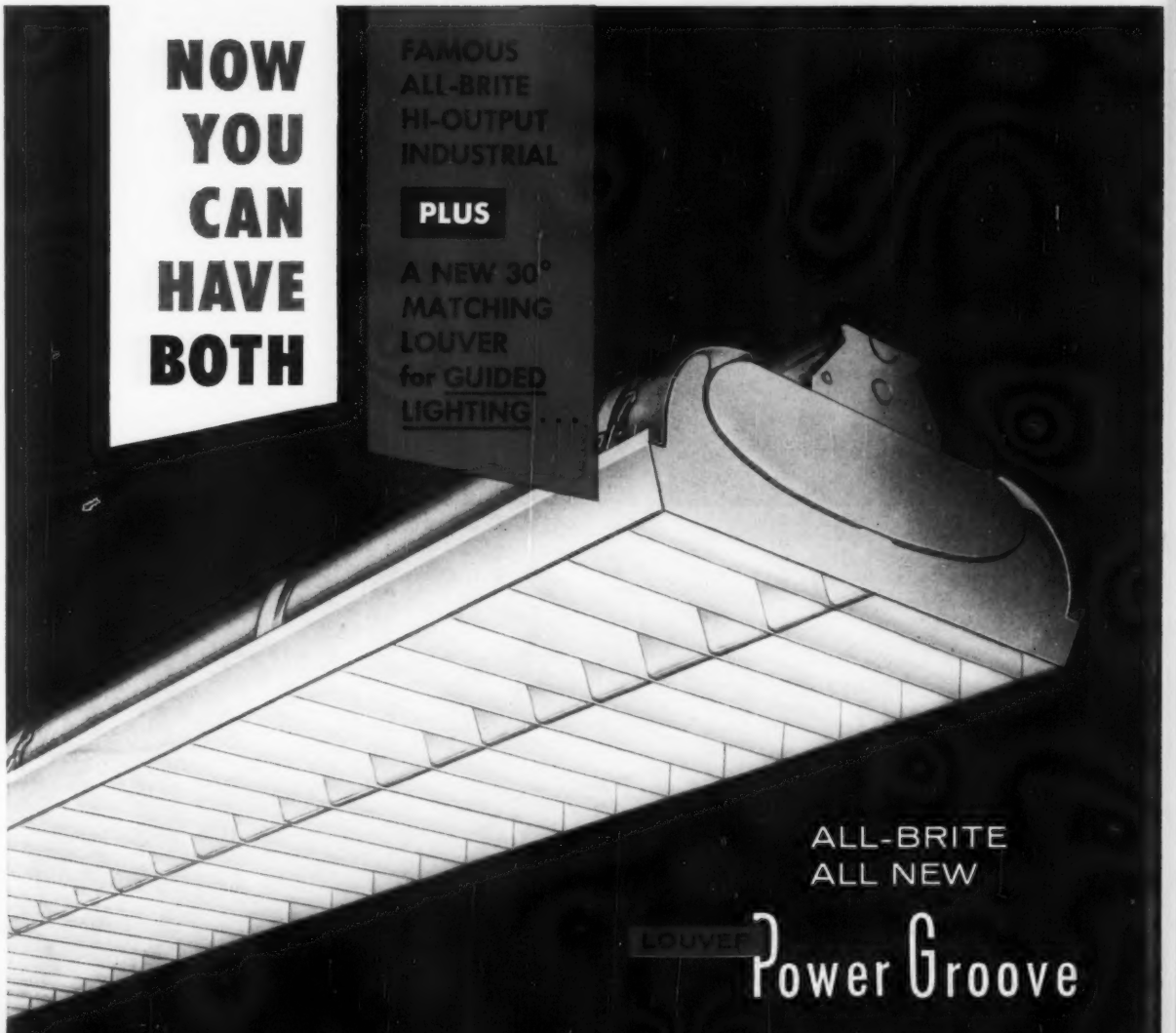
Everything Electrical Graybar

NOW YOU CAN HAVE BOTH

FAMOUS ALL-BRITE HI-OUTPUT INDUSTRIAL

PLUS

A NEW 30° MATCHING LOUVER for GUIDED LIGHTING . . .



ALL-BRITE
ALL NEW

LOUVER
Power Groove

DESIGNED SPECIFICALLY FOR ALL THESE GREAT LAMPS:
VHO, SHO, Power Groove

BUILT LIKE A HEAVY-DUTY TRUCK:
STRONG, SOLID, SAFE

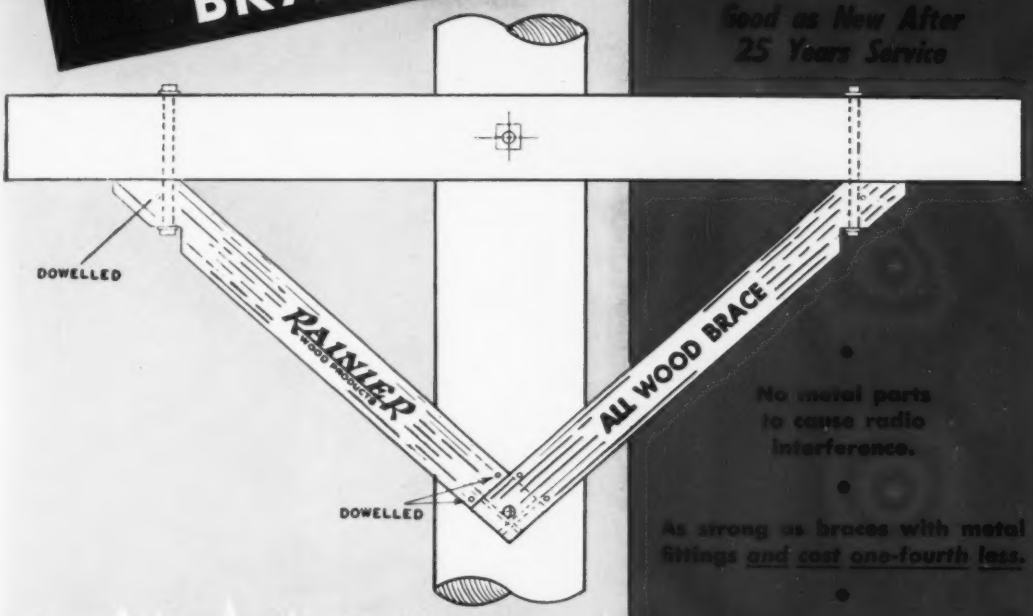
send for catalog and data sheet

ALL-BRITE FLUORESCENT FIXTURES, INC.
352 SHAW ROAD, SOUTH SAN FRANCISCO, CALIF.

PLANTS ALSO IN LOS ANGELES AND SEATTLE.
IN CANADA: ALL-BRITE LIGHTING (B.C.), VANCOUVER, B.C.
REPRESENTATIVES THRUOUT THE UNITED STATES AND CANADA

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

RAINIER WOOD PRODUCTS CROSSARMS BRACES



ALL WOOD BRACES

Good as New After 25 Years Service

- No metal parts to cause radio interference.
- As strong as braces with metal fittings *and cost one-fourth less.*
- No right- or left-hand members. (Any two pieces make a pair).
- Bolt holes reinforced with spiral dowels.
- Manufactured from seasoned, straight-grained Douglas fir.
- Sample pair ALL WOOD BRACES furnished on request.

4 Facts About Rainier Crossarms

SELECTION — Extra value in crossarms, as in many other quality products, is the end result of planned manufacture. With this company the careful selection of timber for manufacture of Rainier crossarms is the first important step.

SEASONING — Rainier air seasoned crossarms are also carefully seasoned by control of air circulation and by the location of seasoning sheds, as well as proper piling of the timber during the drying period.

KILN DRYING — Rainier kiln drying is superior because of scientific control during the seasoning period — correct temperature and the right humidity all the time while in the kiln means all fungus growth killed — timber seasoned throughout.

STOCKS — Graybar offers the careful buyer of crossarms an additional service — stocks at strategic locations. For planned-ahead buying or for emergencies, this fact is your assurance of lower shipping costs and quicker service.

Distributed by Graybar Electric Company

CONTACT YOUR NEAREST GRAYBAR OFFICE FOR PRICES

AMERICAN · CROSSARM AND CONDUIT DIVISION

A. B. CHANCE CO.

RAINIER WOOD PRODUCTS TRADE MARK

FOR OVERHEAD AND UNDERGROUND CONSTRUCTION

Sales Offices

CHICAGO, ILL.
KANSAS CITY, MO.
MINNEAPOLIS, MINN.
DANVILLE, PA.
CHEHALIS, WASH.
GAINESVILLE, FLA.

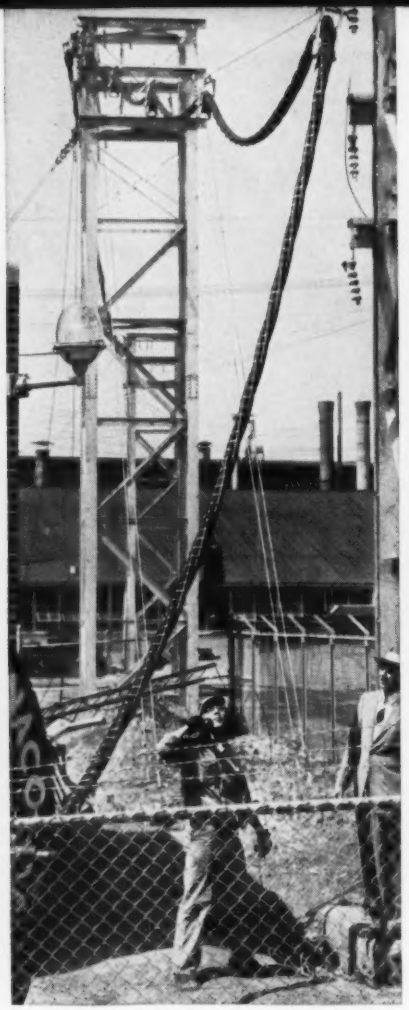
GENERAL OFFICES
7726 SHERIDAN ROAD
CHICAGO 26

TOP QUALITY PRODUCT

OTHER AVAILABLE FROM GRAYBAR

Everything Electrical Graybar Electric Company

Quickly installed aerial cable. Here's an application where 600-volt Durasheath was quickly installed and easily terminated. Durasheath's neoprene jacket resists weather, abrasion, heat, fumes. Assured: dependable performance and long-range economy!



Factory-assembled aerial cable, made up of 3 single-conductor 15-kv Durasheath cables. Easy splicing, tapping and terminating meant simplified installation in the job shown here. No ducts, crossarms or insulators were needed. Wiring is neat, safe.

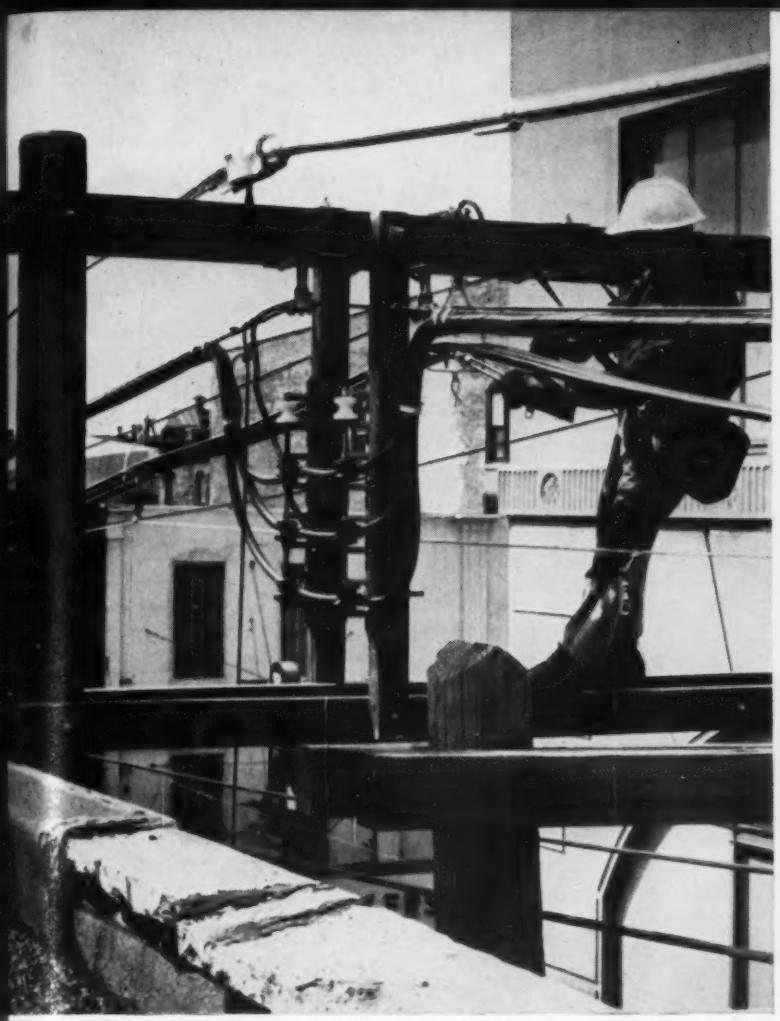
Direct-burial cable. The moisture-, oil-, and a resistance of Durasheath's jacket makes it ideal cable for direct-in-the-ground applicat like the one shown above. Its flexibility cuts stallation time and cost because Durasheath is e to handle. Its durability cuts maintenance c

Look at the ways you can save installation time and cost—with dependable Anaconda Durasheath Cable!

Wherever you want... whenever you want—this versatile power cable lets you install circuits fast... easily... at low cost! Use it aerially... in ducts... underground—in long runs with minimum splicing, indoors or out!

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

Graybar Everything Electrical



Field-assembled aerial cable. Versatile Anaconda Durasheath power cable was quickly field-assembled into aerial cable with the simple spinning operation shown here. Additional Durasheath was run along the building, grouped in a neat assembly by insulators and straps. It's another example of the way dependable Anaconda Durasheath adapts itself to your power cable needs—whether indoors, outdoors or both. Check into Anaconda Durasheath power cable for your wiring plans!

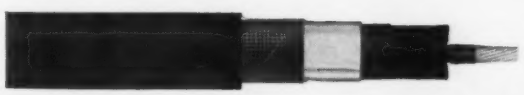
Installed in ducts. Durasheath's flexibility meant quick and easy installation here. And once installed, its tough neoprene jacket assures long, trouble-free life. Because Durasheath adapts itself to so many uses, your inventory problems are lessened—fewer cables need be carried in stock!

The installations shown above have one thing in common: they're all using Anaconda Durasheath* rubber-insulated neoprene-jacketed power cable—each for a different *kind* of application! Although the above photographs were taken at different installations, they could very well be pictures from one and the same job. Versatile Durasheath is a power cable that can be used to meet almost *any* installation need!

Such versatility in the use of Durasheath enables you to plan the most efficient layout for your wiring – then carry these plans through economically, with assurance of reliability. Talk to the Man from Anaconda about Durasheath. For full information, write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Trademark

S8276GR Rev.



ANACONDA DURASHEATH ALL-PURPOSE POWER CABLE
Available in all sizes, single and multiple conductor, copper or aluminum, 600 to 15,000 volts and higher.

Insulation. Type RHW, Anaconda ANW, Anaconda Butyl (AB) high-voltage or Anaconda Butyl (AHW) low-voltage rubber compound.

Jacket. Specially compounded neoprene with high resistance to flame, oil, acids, alkalies, sunlight and ozone. Has high tensile strength. Takes flexing at extremes of temperatures.

SEE THE MAN FROM

ANACONDA®

FOR DURASHEATH CABLE

TOP QUALITY PRODUCT

ANOTHER AVAILABLE FROM GraybaR

Graybar Everything Electrical Graybar Electric Company

"AMERICAN BRAND" Utility Ropes IN NATURAL OR SYNTHETIC FIBERS

MANILA—Created especially for the utility field, "American Brand" and "AMCO All Weather" Pure Manila Ropes are used for hand lines, pole lines, guy ropes, hoisting and rigging. The special construction and exclusive lubricant reduces water absorption to a minimum and increases its resistance to weathering.

NYLON—About twice as strong as natural fiber rope, the initial cost is more but it will far outlast manila. Used for similar purposes as manila, its high strength permits the substitution of smaller and lighter ropes to accomplish the same job. Possessing high shock absorbency and high impact strength, nylon is unsurpassed as a safety line. In addition, it is easier to handle, impervious to rot, has greater flexibility and resists distortion and kinking.

Floterope®—The new polyethylene and polypropylene rope used for hand lines, hot lines, sagging lines, guy lines and catenary lines. FLOTEROPE is up to 75% stronger than manila (the ¼" size has a breaking strength of 1050 lbs.) and up to 35% lighter. It is an excellent insulator and exhibits low dielectric loss. On some installations, insulators, special fittings and extra brackets have been eliminated; fewer poles and wider spans have been possible; ice build-up and lightning damage have been reduced.

IN ALL SIZES ...¾" DIAMETER AND LARGER... IN COILS OR ON REELS

*GraybaR QUALITY SINCE 1869 *REG. U.S. PAT OFF

Distributed by *GraybaR ELECTRIC COMPANY

With this combination of "American Brand" Ropes, you can reduce installation and maintenance costs, eliminate safety hazards and improve operating efficiencies.

AMCO

Western Mill

ST. LOUIS CORDAGE MILLS

Eleventh & Lafayette Streets • St. Louis 4, Mo.

AMERICAN

MANUFACTURING COMPANY, INC.

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ROPE • TWINE • OAKUM • PACKING

Sales Offices: BOSTON CHICAGO HOUSTON NEW ORLEANS PHILADELPHIA SAN FRANCISCO

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

BENJAMIN

...always the source of good lighting... anywhere in the plant!

Now Setting the Pace in COMMERCIAL LIGHTING too!

When you look at factory lighting with the roof off like this it brings to focus the many different lighting units it takes to provide the right light for every seeing task. With the complete BENJAMIN line you are assured of a specially-engineered unit for every factory and office location—designed for better seeing with maximum eye comfort.

Send for illustrated data bulletins on any or all of the units shown here.

Benjamin Electric Mfg. Co.
A SUBSIDIARY OF THOMAS INDUSTRIES INC.
1600 Northwest Highway
Des Plaines, Illinois

1. Explosion-Proof Units
2. Vapor-Tight Incandescent
3. Triple-Flo Continuous Lines
4. Stream-Flo Continuous Systems
5. Stream-Flo w/27° Shielding
6. RLM Dome Reflectors
7. Stream-Flo w/Plastic Covers
8. Elliptical Angle Reflectors
9. Steelite Armor-Clad Units
10. Twin-Flo Individual Units
11. Symmetrical Angle Units
12. Semi-Direct Industrial w/25% Uplight
13. Twin-Flo w/10% Uplight
14. Panel-Glo Safari Systems
15. Stock-Bin-Lite
16. Commercial Lighting Units
17. Panel-Glo Corrugated Systems
18. Glass-Enclosed Troffers
19. RD Projectors
20. Duo-Service Floodlights

R-133RRR

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GRAYBAR

Everything Electrical Graybar Electric Company

FOR VOLTAGES UP TO 600...

There's a *Safe and Dependable* BUSS Fuse or FUSETRON Fuse to fit the needs of every user

If you want Plug Fuses . . .

Use BUSS Clear Window Plug Fuses

Their one-piece body and "safety" design guarantees protection.

They are most convenient to use too, because real big windows and white backgrounds permits entire fuse strip to be seen. Even in poor light a blown BUSS fuse is easy to find.

Ask for BUSS Bulletin WUS

If you want to make safe protection REMAIN SAFE as well as REDUCE blowing fuses . . .

Use BUSS Fustats (have Type S base)

FUSTATS like Fusetron Fuses have a dual-element and therefore, stop needless blowing — and they do more.

They have a type S base that prevents anyone from replacing them with a penny or substitute — or using a size too large to protect.

FUSTATS fit standard plug fuse holders by means of an inexpensive adapter that locks in place and needs never to be replaced.

Ask for BUSS Bulletin SCPS

If you want to reduce blowing of Plug Fuses . . .

Use FUSETRON dual-element Plug Fuses

FUSETRON Plug fuses protect like ordinary fuses against short-circuits and overloads — but unlike ordinary fuses they won't blow on motor starting currents or other harmless overloads.

They are the type of fuses recommended in the 1953 National Electrical Code.

Ask for BUSS Bulletin TCPS

To protect motors and apparatus of voltages up to 125 against burnout . . .

Use 0 to 14 amperes BUSS Fustats

A FUSTAT of the proper size installed to handle only the motor current will reduce to a minimum the chance of a motor burnout from an excessive over-current. In like manner it will protect solenoids, coils and transformers against burnout.

FUSTATS have the same degree of Underwriters' approval for both motor-running and short-circuit protection as the most expensive devices made. They give all the protection it is possible to obtain with any device on the market.

Ask for BUSS Bulletin SMPS

FUSES! . . . THE SAFEST AND MOST DEPENDABLE PROTECTION YET DEVISED!

A fuse has just one vital part — a thin narrow strip of fuse metal. When the heat of a short-circuit is applied, the fuse link must melt and open the circuit.

The high speed operation of the fuse reduces to a minimum the danger of short-circuit damage to wiring and equipment.

Fuses offer dependable protection over the years.

The fuse link is sealed in. Dust can't get at it. Corrosion or oxidation can't increase its capacity or lengthen its blowing time.

There are no hinges, pivots or contacts to stick or get out of order.

Millions of fuses have been in operation 30 years or more, because there has been no trouble on the

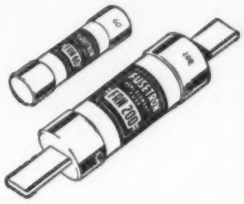
Play Safe! Install BUSS Fuses or

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

Graybar Everything Electrical

If you want fuses that — abolish all needless blows, stop overheating in panels and switches, protect motors against burnouts . . .

Use FUSETRON dual-element Fuses



With rare exceptions, ordinary fuses or circuit breakers do not protect except against short-circuit but FUSETRON fuses provide TEN POINT protection.

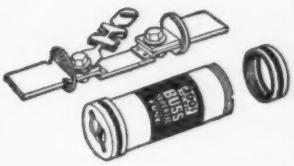
1. Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

FUSETRON duel-element FUSES save you time and money because they are made to PROTECT — not to blow.

Ask for Bulletin FIS

If you want Renewable Fuses . . .

Use BUSS Super-Lag Renewable Fuses



The big advantage of these fuses over all other renewable fuses comes from the prevention of useless interruptions of service caused by needless blows.

The reason for this performance is found in the design of the fuse-case which assures good contact on the fuse link, even if the fuse is renewed by an inexperienced person — and by the time-lag built into the link that prevents the fuse from opening on motor starting currents or other harmless overloads.

Ask for BUSS Bulletin RCS

If you want SAFE protection on loads above 600 and up to 5000 amps . . .

Use BUSS Hi-Cap Fuses

On voltages up to 600, high speed operation on heavy shorts limits current to safe values. This minimizes damage to equipment and cuts down dangerous stresses on transformers.

Ask for BUSS Bulletin HCS

To limit fault currents to very low values . . .

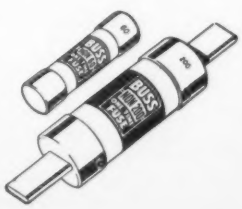
Use BUSS Limitron Fuses

The extremely fast opening characteristics of these fuses prevent heavy short-circuit currents from building up under fault conditions.

Ask for BUSS Bulletin HLS

If you want Non-Renewable Fuses . . .

Use BUSS One-Time Fuses



They save you time and trouble because they get the same engineering care in manufacture as do all products carrying the BUSS Trademark.

Every BUSS One-Time fuse can be depended upon to operate as intended under all service conditions.

Ask for BUSS Bulletin NCS

For protection of TV, Radio, Instruments, Radar, Avionics and Electronic Equipment . . .

Use BUSS and FUSETRON Small Dimension Fuses

A complete line is available. Made in Dual-element (slow-blowing), Renewable and One-Time types in sizes from 1/500 ampere up.

And there is a companion line of BUSS Fuse Clips, Fuse Blocks and Fuse Holders to take them.

Ask for BUSS Bulletin SFB

circuit as they are protecting and continue to operate to open.

Yet, after years of inactivity, you can be sure the fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

When Fusetron fuses do blow, there is no recalibration needed. As quickly as the fault in the circuit is corrected, you slip in a new fuse that has been CALIBRATED AT THE FACTORY BY ENGINEERS — a fuse that is as safe and dependable as the one that blew.

Fusetron Fuses Now!

FOR MORE INFORMATION ON BUSS AND FUSETRON FUSES WRITE TO: BUSSMANN MFG. DIVISION McGRAW-EDISON CO. ST. LOUIS 7, MO.

THROUGHOUT THE ENTIRE ELECTRICAL SYSTEM

FUSETRON

TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION

BUSS

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GraybaR

Everything Electrical GraybaR

Give the Guy a CHANCE

When anchor users make a study of earth anchors—make their own pull tests for holding power—make their own comparisions . . . we're happy, because the Chance 8-Way almost always takes top position for holding power and ease of installation.

Such tests prove that the 8-Way holds far more than its rated load because its *eight* blades expand to form a complete pyramid shaped square—there is no wasted space between blades. The guy load is distributed to all *eight* blades all the way around the hole. Chance 8-Way Anchors are available in sizes from 60 to 200 square inches in area, for distribution and transmission line guying. For the best in service on the best in line construction and maintenance materials, specify CHANCE from Graybar.

A·B·CHANCE CO· General Offices: Centralia, Mo.
(A·B·CHANCE CO· of Canada, Ltd., Toronto)

ABC INDUSTRIES

and there are CHANCE ANCHORS for all soil and guying conditions

8-WAY EXPANDING
The 8-Way is usually installed in clay or loam. Available in sizes from 60 to 200 square inches in area, for distribution and transmission line guying.

NO-WRENCH SCREW
For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.

SWAMP SCREW
For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

NEVER-CREEP
Reinforced structural steel. Pulls entirely against solid, undisturbed earth. For extra heavy loads in clay or loam.

CROSS-PLATE
For heavy-duty anchoring in machine bored holes. Holds better than logs or slugs. Saves time and money.

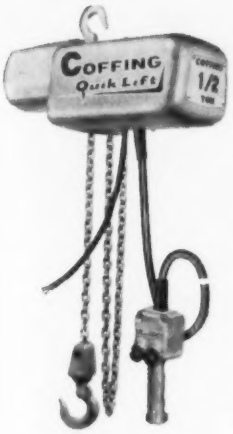
8-WAY CONE
Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

EXPANDING ROCK
No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.

CA58-13

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GRAYBAR

Coffing Hoists for Safety and Economy



Coffing Quik-Lift Electric Hoists

New coil chain line features push-button controls on all models. Made with lightweight aluminum castings, they are available in 20 models ranging from ¼ to 2 tons in capacity. For other lifting speeds and larger capacities, we offer the Quik-Lift Series "S".

Super Power Coil Chain Hoists

Compound lever and ratchet-and-pawl construction make them lightest, safest, most efficient hoists in their class. Six models in capacities from 1½ to 5 tons—1½ and 3 ton in aluminum as well as malleable iron.

Safety Pull Roller Chain Hoists

Ratchet-and-pawl construction assures safe operation, and "Safety Valve" handle gives before any load-bearing part can fail—warning operator. Ten models in capacities from 1½ to 15 tons.

Challenger Spur Gear Hoists

Light-weight and dependable, the Challenger is available in ½ and one ton capacities. Durable construction and sealed-in lubrication reduce maintenance costs to a minimum.

Mighty-Midget Pullers

Light and compact—500 pound model weighs but 6½ pounds, 1000 pound model but 9½. Handle can be used either as a lever or a high speed crank.

Duff-Norton Jacks Save Time, Energy and Money

Pole-Pulling Jacks

Duff-Norton pole-pulling jacks will pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or upright as required. Service need not be interrupted when these jacks are used.

Cable Reel Jacks (single action)

Jacks are equipped with adjustable cable reel lift incorporating a steel hook which can be placed at any point on the lifting rack. Reels of different diameters can be picked up at any height. Five ton model 524MCR is especially adaptable to warehouse use for handling cable, wire, hemp rope, leather belting and the like.

DUFF-NORTON

Duff-Norton Company

MAIN PLANT AND GENERAL OFFICES: PITTSBURGH 30, PA.

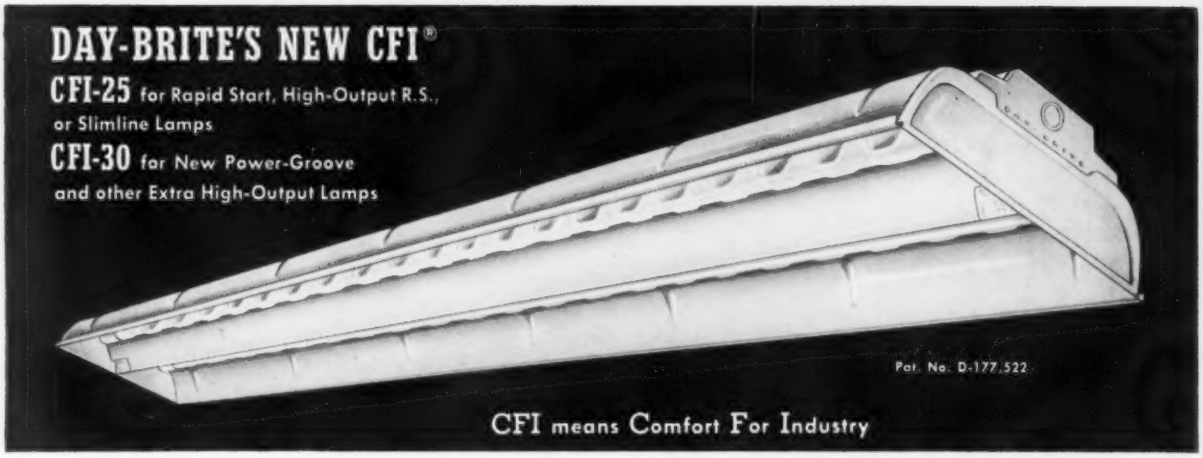
THE CANADIAN DUFF-NORTON COMPANY, LTD., TORONTO 6, ONT.

Coffing Hoist Division • DANVILLE, ILLINOIS

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

Graybar Everything Electrical

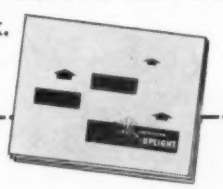
Today's Best Lighting Value for Every Industrial Application


DAY-BRITE'S NEW CFI®
CFI-25 for Rapid Start, High-Output R.S., or Slimline Lamps
CFI-30 for New Power-Groove and other Extra High-Output Lamps
Pat. No. D-177,522
CFI means Comfort For Industry

25% uplight washes out harsh ceiling contrasts. "Up-draft" action provides more efficient self-cleaning. Center "V" and closed ends for added shielding and strength. Reflection surfaces are lifetime porcelain enamel for easy cleaning. 8-foot rigid channel, one-piece reflector for simplified installation. Spring-loaded sockets hold lamps securely, speed relamping. *All this at up to 17.7% lower cost!*

Get the FACTS...and the FIXTURES

Now industrial fixture buyers can get more light with greater eye comfort at lower installed cost, lower operating cost, and with lower annual owning costs. Today's lower-priced Day-Brite CFI-30, used with new Power-Groove lamps, actually reduces the cost of lighting industrial areas *as much as 54%*. For detailed information, call your Day-Brite representative listed in the Yellow Pages of your phone book. Or use the coupon below.



Day-Brite Lighting, Inc.
6270 N. Broadway
St. Louis 15, Missouri

GENTLEMEN: Please send me information about Day-Brite's new CFI fixture and "Operation Uplight."

*Name*_____

*Title*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*____ *State*____

DAY-BRITE OPERATION UPLIGHT

Look for this emblem displayed by Distributors offering Day-Brite Comfort for Industry fixtures—available now for immediate delivery!

A-120 © 1959 by Day-Brite Lighting, Inc.

eye-li RE/LIGHTING — DAY-BRITE LIGHTING FIXTURES

DAY-BRITE LIGHTING, INC.
St. Louis, Mo. · Santa Clara, Calif.

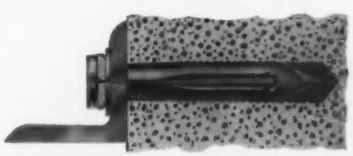
NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GEYER

NOW! ONLY 20 SECONDS*
to ANCHOR to BRICK and CONCRETE
COMPLETE...HOLE and ALL with

ONLY 3 STEPS

- Drill Hole (same diameter as anchor)
- Use DIAMIDE or Di-Forge Drills
- Put hardware in place. Insert DHD Anchor THRU Hardware
- Insert Nail and Hammer Home



FORGED ALUMINUM NAIL-TYPE ANCHOR ASSEMBLY

(consisting of Anchor and Hot Galvanized Nail)
Size range: 3/16" to 1/2" dia. 7/8" to 3 1/2" length. Exclusive internal rib construction provides variable, radial expansion to compensate for irregularity in hole diameter.

☐ Would you like to put this anchor to a real test? Let us send you a box of 25 without charge. Try them and test them on a job.

☐ Would you like to have a trained anchoring man contact you to help you solve some particular problem. Our representatives are located at these convenient industrial centers and are available for consultation: Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington, D. C., also Montreal, and Vancouver, Canada.

☐ Please send me your catalog sheet.

* 3/16" x 7/8" size

DIAMOND EXPANSION BOLT COMPANY, INC.
Garwood, New Jersey

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Everything Electrical Graybar Electric Company

EVERSTICK ANCHORS

FOR TOUGH ANCHORING JOBS!

Today's anchoring jobs bring Eversticks to the forefront. They provide tight, safe anchoring . . . always in excess of rated capacities. Easy and quick to install . . . made of finest grade maleable iron with superior rust-resisting qualities and exceptional toughness. Every Everstick is plainly marked for ease of handling and storing.

AN EXCLUSIVE EVERSTICK FEATURE

The nut housing feature of the Everstick prevents rod from slipping thru while installing and provides a solid substantial base for the expanding blades.

There's a complete line of Eversticks for all strain requirements. 15 sizes of 2-way—3-way—4-way types.

THE ANCHOR OF MERIT

EVERSTICK ANCHOR CO., Fairfield, Iowa

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GENERAL CABLE

the largest independent manufacturer of electrical

WIRES and CABLES

QUALITY PRODUCTS to cover every wire and cable requirement.

- **BARE AND WEATHERPROOF** Copper and Aluminum
- **BUILDING WIRES AND CABLES** Rubber and Thermoplastic
- **SERVICE CABLES**
- **POWER AND CONTROL CABLES** Rubber and Thermoplastic Asbestos, Varnished Cloth
- **PORTABLE CORDS AND CABLES**
- **SAFETY MINERAL INSULATED WIRING SYSTEMS**

for quality and service... **specify GENERAL CABLE**

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

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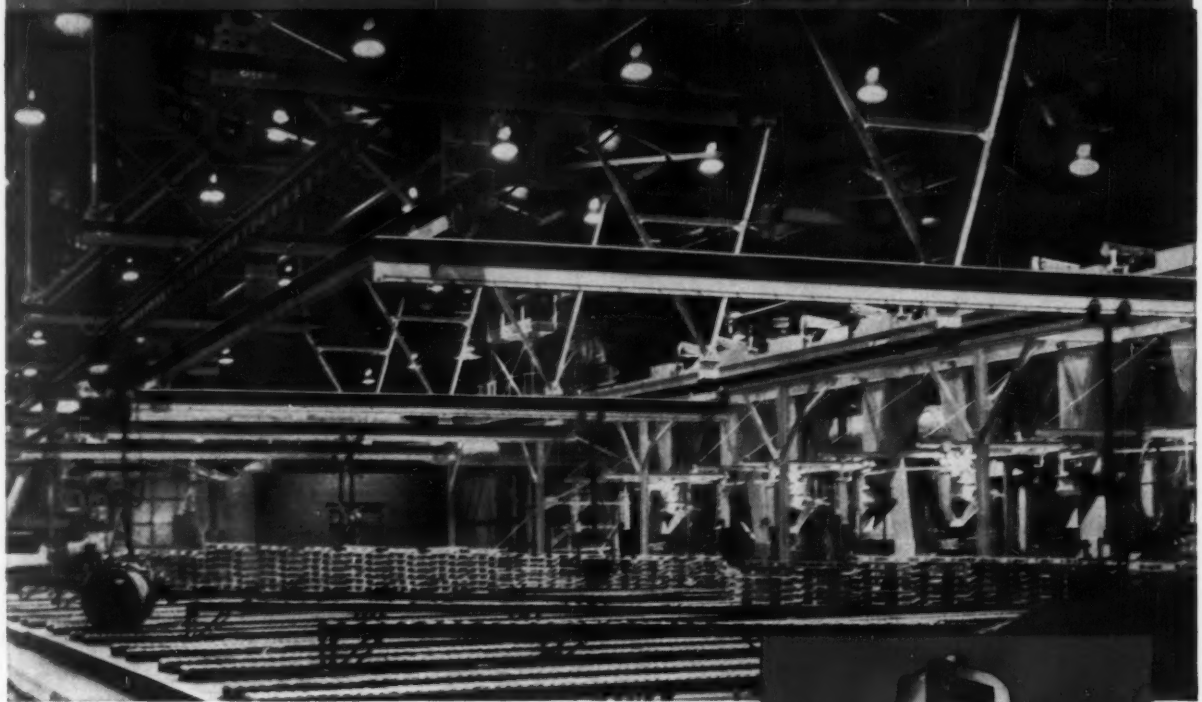
Everything Electrical GraybaR

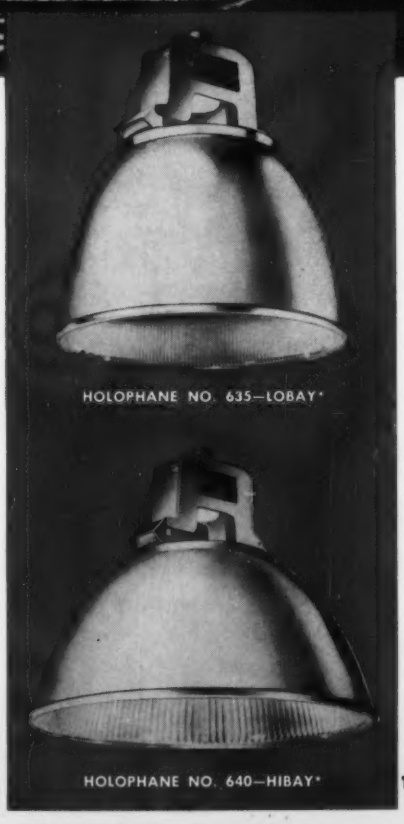
You Get BETTER LIGHT at LOWER COST

when You Specify HOLOPHANE REFLECTORS



- ***Prismatic Control assures Greatest Utilization of Light***
- ***High Output from Long Life Mercury Vapor Sources***
- ***Low Operating and Maintenance Costs . . .***

Where so much in plant output, safety and visual comfort depends on efficient lighting—you can depend on HOLOPHANE REFLECTORS... Their simplified construction provides easy installation and economical maintenance... Light sources are deep shielded, eliminating glare. Reflector surfaces are kept clean by upward draft action... Investigate how a modest investment in quality lighting can mean sustained increases in production and profits. Write for engineering data.



HOLOPHANE NO. 635—LOBAY*

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HOLOPHANE

COMPANY, INC. • ***Lighting Authorities Since 1898***

342 Madison Ave., New York 17, N. Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONT.

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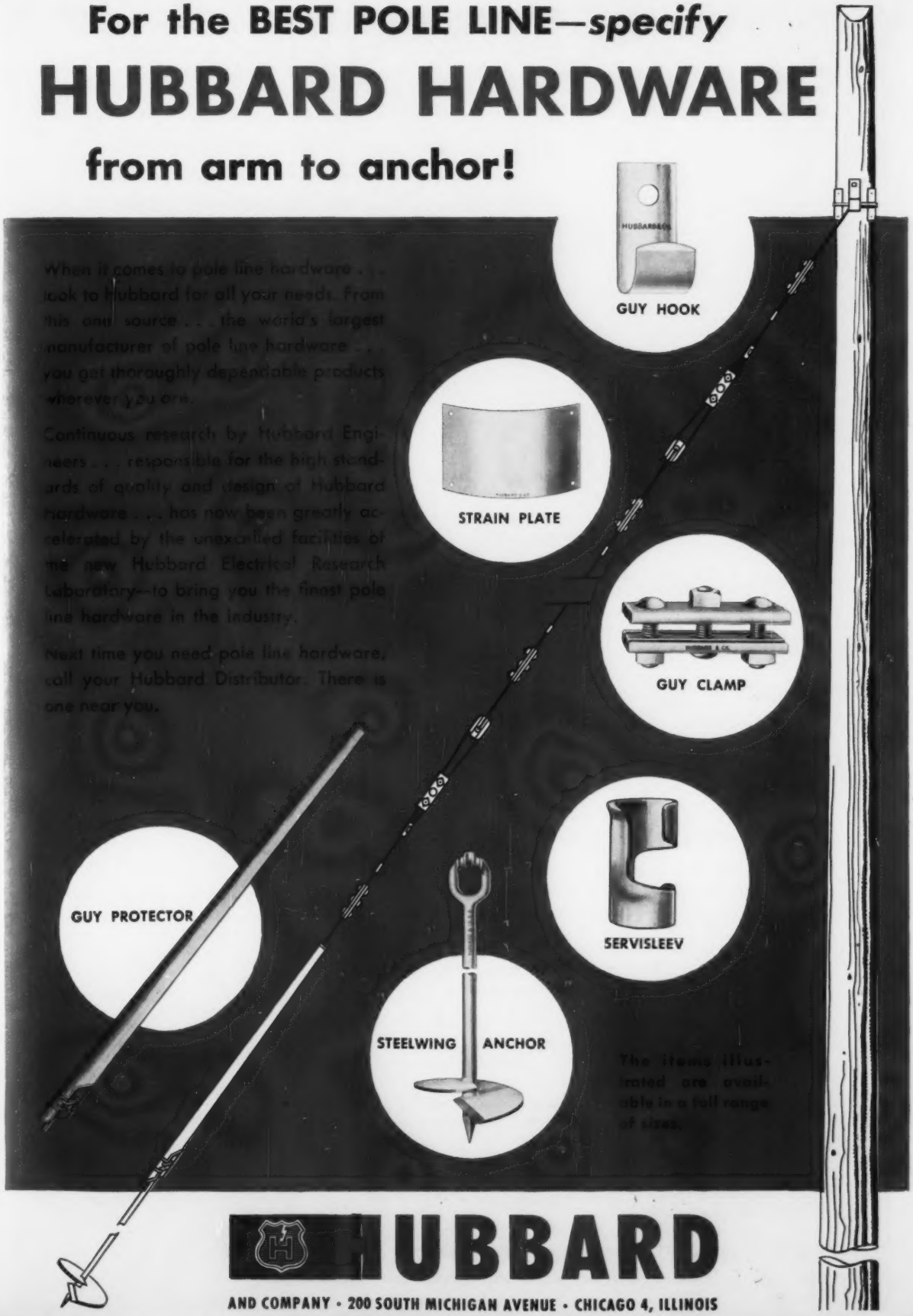
Everything Electrical Graybar

For the BEST POLE LINE—*specify*

HUBBARD HARDWARE

from arm to anchor!



When it comes to pole line hardware . . . look to Hubbard for all your needs. From this one source . . . the world's largest manufacturer of pole line hardware . . . you get thoroughly dependable products wherever you are.

Continuous research by Hubbard Engineers . . . responsible for the high standards of quality and design of Hubbard hardware . . . has now been greatly accelerated by the unexcelled facilities of the new Hubbard Electrical Research Laboratory—to bring you the finest pole line hardware in the industry.

Next time you need pole line hardware, call your Hubbard Distributor. There is one near you.

The items illustrated are available in a full range of sizes.

HUBBARD

AND COMPANY • 200 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

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NOTHER AVAILABLE FROM GTEBAR

OTEBAR Everything Electrical GraybaR ELECTRIC COMPANY

Illustration, above, shows size relationship of a Hubbell 4-wire, 50 amp. "Twist-Lock" cap and a midget 2-wire, 10 amp. "Twist-Lock" cap . . . a good indication of the wide range of sizes and ratings available.

Twist-Lock®

. . . for every purpose

"Twist-Lock", *first and still the finest locking connector made,* is designed for portable electrical equipment requiring constant contact pressure and safe, secure locking protection and convenience. It is ruggedly constructed to withstand abuse and provide long life service. "Twist-Lock" offers many wiring features which simplify installation and eliminate costly service call-backs.

8 DIFFERENT LINES

"Twist-Lock" represents the safest and most complete quality line of locking connectors ever developed. Caps, connector bodies, motor bases and receptacles are available in the eight different types and sizes shown at right, and in ratings to conform to your electrical specifications.

Every cap and connector body from 10 amp. to 50 amp. is now available with "Seal-Tite" rubber covers for weatherproofing purposes, protection from dust and dirt or from hard knocks and rough usage.

REGULAR Twist-Lock
Rugged construction. Regular wiring. Wide range of types and ratings.

SUPER Twist-Lock
Screwless terminals and dead front for faster, safer wiring.

MIDGET Twist-Lock
The same high quality in midget size. Many O.E.M. uses. Wide selection of types and ratings.

GROUNDING Twist-Lock
For 125 v. grounding only. Non-interchangeable with regular "Twist-Lock".

"INSULPRENE" Twist-Lock
Tough neoprene compound resists steam, hot water, grease, acids, etc.

30 AMP. SUPER Twist-Lock
Non-interchangeable with 20 amp. units. Prevents interchange between 20 and 30 amp. service. Screwless terminals and dead front.

50 AMPERE Twist-Lock
In 600 v. A.C. and 250 v. D.C. Solderless connections. Metal cord grips.

277 VOLT Twist-Lock
Non-interchangeable with other "Twist-Lock" or any other device made. Used for fluorescent lighting.

HARVEY HUBBELL, INCORPORATED
BRIDGEPORT 2, CONNECTICUT • IN CANADA: SCARBOROUGH, ONTARIO

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IT'S PERFORMANCE THAT COUNTS

One piece of galvanized steel strand may look much like any other BUT there can be a marked difference in performance.

That is why it is so important where overall construction costs are high (compared with the cost of the strand itself) to obtain the best strand available for a specific job.

More than 50 years of specialized skill and experience go into every coil and reel of *Crapo* Galvanized Steel Strand. Each size and grade is produced from selected steel, processed under laboratory supervision and galvanized by the dependable Crapo Process to meet the demands of the service for which it is intended.

Both individual wires and finished strand undergo rigid laboratory tests to make certain that the final product conforms to highest standards and specifications.

Thus you can be sure, when you specify *Crapo* Galvanized Steel Strand for guys, messenger or overhead ground wire, that you are getting a consistently high quality product which will give you the utmost in performance.

Crapo

GALVANIZED

STEEL STRAND

SPECIALIZING IN STRAND FOR THE UTILITIES . . .

Our engineering, manufacturing and testing facilities are geared to the production of quality steel strand for the power and communication industries. If you have a problem involving the use of steel strand in overhead lines, ask your Graybar representative for pertinent technical information!

Crapo Galvanized Steel Strand is available in all standard sizes and grades and in Class A, B and C Coatings.

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

TOP QUALITY PRODUCT

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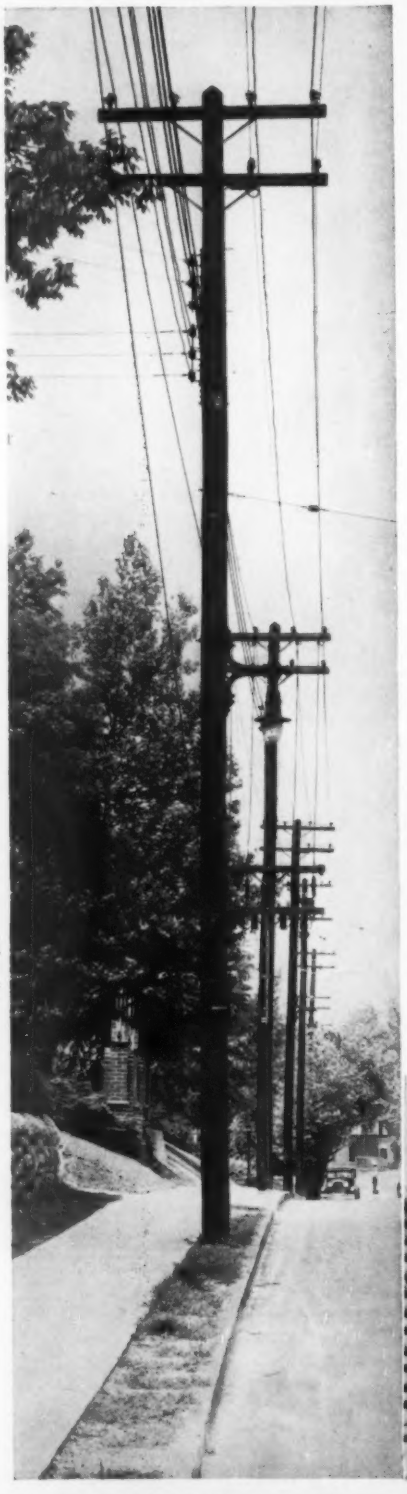
Graybar Everything Electrical Graybar ELECTRIC COMPANY

DEPENDABLE



Poles

of Selected Sound Timber Scientifically Treated

THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 84 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

Distributed by GraybaR ELECTRIC COMPANY

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

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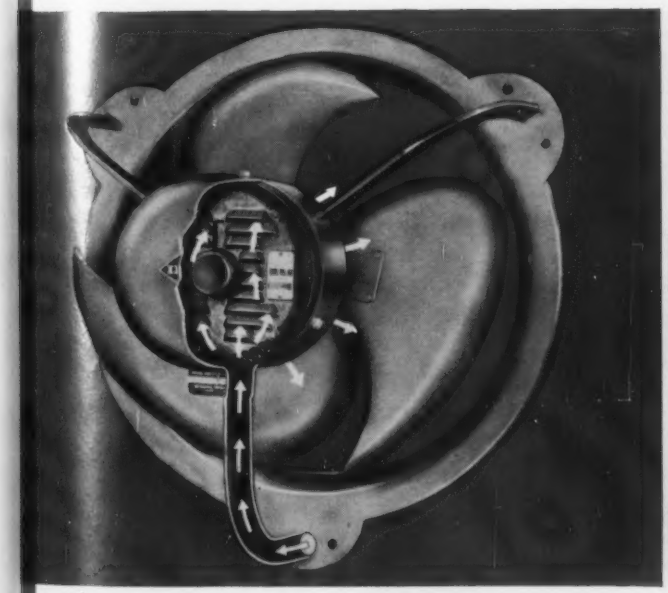
Everything Electrical GraybaR ELECTRIC COMPANY

At His Finger Tips (and Yours). Ilg's "One-Name-Plate" guarantee covers both the Ilg-built *self-cooled,* direct-connected motor and the dynamically balanced, patented "Q" Type fan wheel.

Not a Ripple at 1140 revolutions. Put a glass of water on an Ilg direct-connected, *self-cooled* propeller fan and you'll see how vibration-free a fan can be at full operating speed. Notice: not a ripple!

only at ILG can you count on all four



Follow the Arrows and you'll see why Ilg-built *self-cooled* motors stay cleaner, run quieter, last longer. Vent pipe brings in clean outside air; pressure cools direct-connected motor . . . exhausts air at front of fan. Motors never run hot.

Quiet in the Carton, Too. Ilg *self-cooled,* direct-connected propeller fans not only *run* without vibration . . . they arrive on the job site in perfect shape. Ilg "vibration-tests" fans in shipping boxes and cartons. No chance for cargo shift.

ILG ELECTRIC VENTILATING COMPANY
2885 N. Pulaski Road, Chicago 41, Ill.
Offices in 57 Principal Cities
Member of Air Moving and Conditioning Association Inc. (AMCA)

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Everything Electrical GraybaR ELECTRIC COMPANY

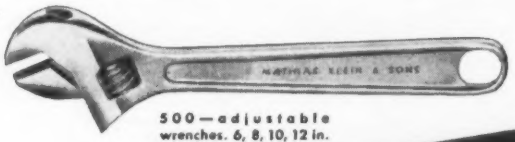
201—famous Klein Side Cutting Plier. Sizes 5, 6, 7, 8 and 9 in.

201-NE—rounded nose side cutting plier. Sizes 5, 6, 7, 8 and 9 in.

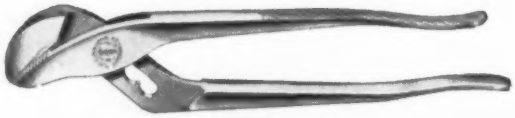
213-9NE—high leverage plier. Will cut regular and weatherproof hard drawn copper wire up to No. 2.

301—long nose plier. Available in 5-, 6- and 7-in. sizes. Also may be had with cutters.

202—narrow nose oblique cutting plier. Available in 5- and 6-in. sizes.



500—adjustable wrenches. 6, 8, 10, 12 in.



510—pump plier. One hand operation. Length, 9½ in.

KLEIN TOOLS EST. 1857 TRADE-MARK REG.

over a century of progress

For over 100 years Klein has been producing safety equipment for linemen, electricians and workmen everywhere.

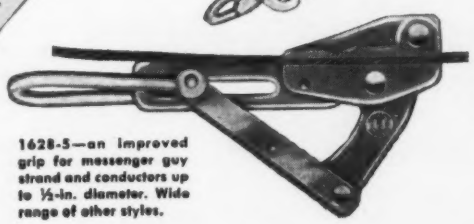
The name Klein stands first among utility companies today as it has constantly during the last century.

Because an imitation can never be as good as the original, make sure that all the pliers and equipment you buy carry the familiar Klein trade-mark.

5249—linemen's belt. Full floating with "Klein-Kord" sliding trace. One of a complete line.

1945-A—climbers, right and left, adjustable from 15 to 18 in. One of a complete line.

5294—"Klein-Kord" nylon safety strap made of multiple plies of strong, woven nylon bonded with frictioning and vulcanized in neoprene.



1628-5—an improved grip for messenger guy strand and conductors up to ½-in. diameter. Wide range of other styles.

This new Klein Catalog is just off the press. A copy will be sent to anyone interested on request.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

TOP QUALITY PRODUCT
ANOTHER AVAILABLE FROM GRAYBAR
Everything Electrical Graybar

NOW KAISER ALUMINUM RIGID CONDUIT COSTS ARE COMPETITIVE WITH STEEL

Now, the delivered price of Kaiser Aluminum rigid conduit is either equal to that of steel–or within 3% of it! And that's not all . . .

LIGHTER WEIGHT REDUCES INSTALLATION COSTS

WEIGHT COMPARISON, ALUMINUM VS. STEEL

U.L. required minimum weight per 100 ft. including couplings, lbs.

Trade Size, Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
ALUMINUM	27.4	36.4	53.0	69.6	86.2	115.7	182.5	238.9	287.7	340.0	465.4	612.9
STEEL	79.0	105.0	153.0	201.0	249.0	334.0	527.0	690.0	831.0	982.0	1334.0	1771.0

Aluminum conduit weighs only *one-third* as much as steel conduit! Result: easier handling . . . less worker fatigue . . . faster installation . . . fewer conduit supports required.

You save on maintenance costs. Aluminum conduit can't rust, resists corrosion, never needs painting . . . lasts longer with minimum replacement.

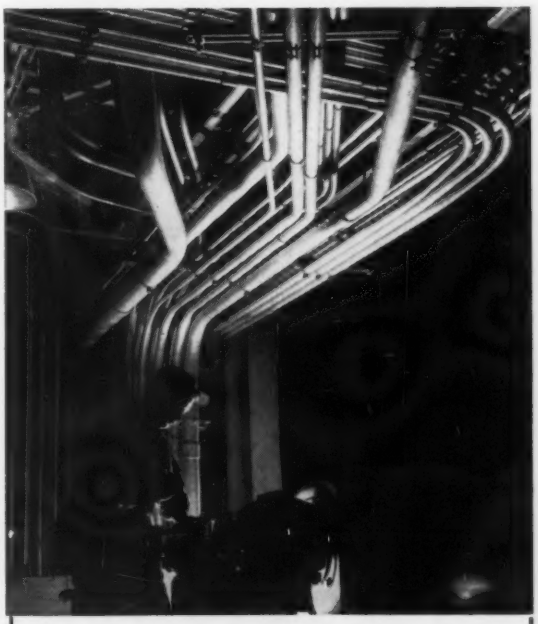
Aluminum conduit is nonmagnetic which reduces the voltage drop. And it's non-sparking for completely safe use in hazardous explosive atmospheres.

All of these extra advantages spell *savings* . . . savings when you buy, savings when you build, and savings in the years to come. Can you afford *not* to find out more about Kaiser Aluminum rigid conduit?

Send Now For Free Literature

We'll be glad to send you a complete run-down on the advantages of using aluminum conduit—comparative conduit weights, comparative labor cost charts, installation details, and much more valuable information.

Get all the facts about Kaiser Aluminum rigid conduit and how it can save you money. Mail the coupon now!



KAISER ALUMINUM

IF IT CARRIES CURRENT, K/A CARRIES IT!

Kaiser Aluminum & Chemical Sales, Inc.
Dept. 1035, 919 N. Michigan Avenue
Chicago 11, Illinois

I want to save money with Kaiser Aluminum rigid conduit. Please send me all the facts.

NAME_____

ADDRESS_____

CITY_____ STATE_____

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Everything Electrical GraybaR ELECTRIC COMPANY

It Pays to have the Right Equipment

Distributed by Graybar Electric Company

Extension Ladders
Sectional Ladders
Carrying Trucks
Diggers
Pruners
Reels
Derricks
Digging Bars
Pole Line Tools

OSHKOSH

POLE LINE TOOLS

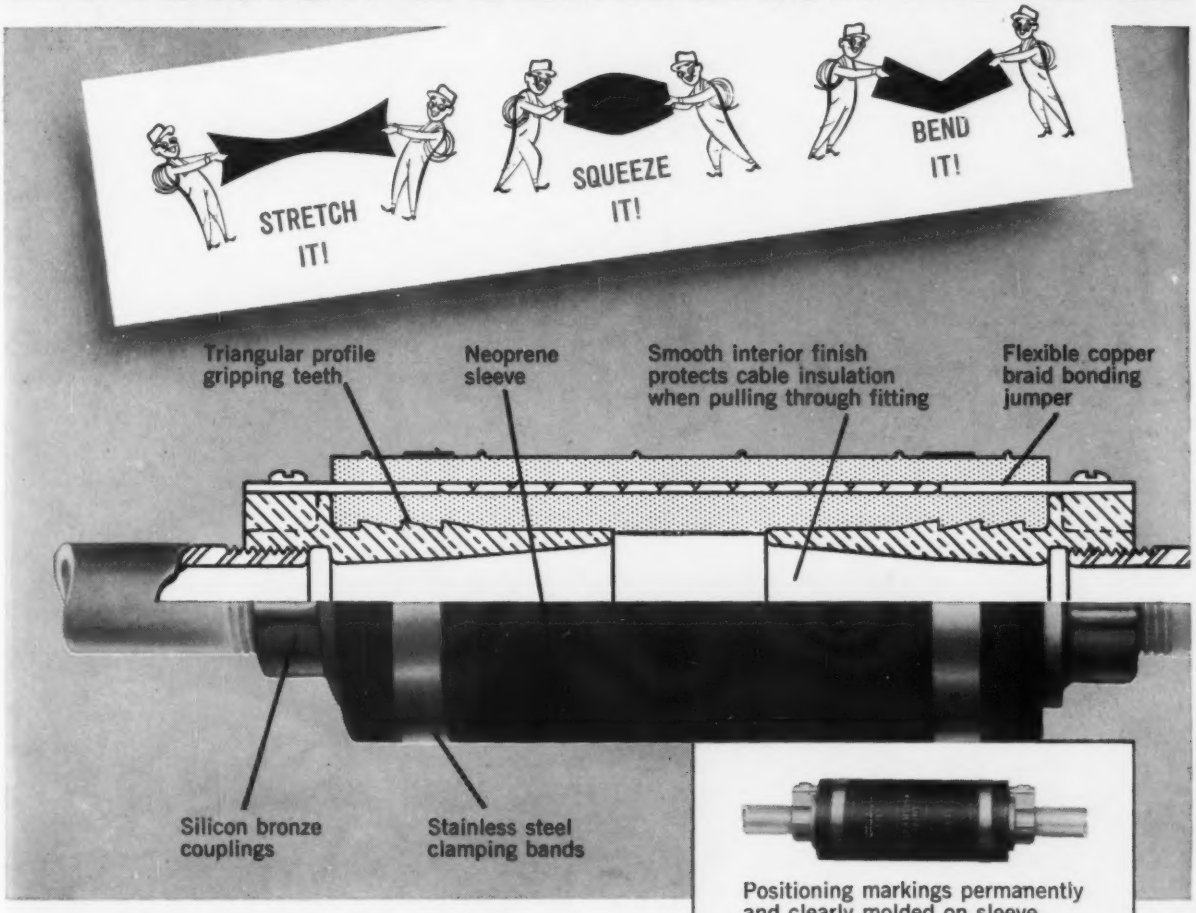
LEACH COMPANY • OSHKOSH, WISCONSIN

Since 1887

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar

Everything Electrical Graybar

For Positive Freedom of Conduit Movement—
THE ALL NEW O.Z. TYPE "DX" EXPANSION & DEFLECTION FITTING!



Here's the newest addition to a long line of O.Z. expansion and deflection fittings — the O.Z. Type "DX"! Of completely new design and construction, it provides fitting features *never found before!*

The all-new Type "DX" is designed principally to compensate for expansion, contraction, and deflection in conduit across expansion joints in concrete, but it also may be used as a vibration damper.

For more information on this rugged, corrosion-proof, Weathertight fitting, call your local O.Z. distributor or write direct to the company.

Positioning markings permanently and clearly molded on sleeve assure proper placement of fitting in expansion joint

- **Compensates for expansion, contraction, deflection; may be used as a vibration damper.**
- **¾" expansion and contraction movement.**
- **30° angular deflection from the normal in any direction.**
- **Corrosion-proof!**
- **Weathertight!**

*Patent Pending

O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

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ANOTHER [redacted] AVAILABLE FROM GraybaR

Graybar Everything Electrical Graybar Electric Company

NEW

JOINS 26% FASTER

Because there are no separate couplings to assemble on the job, Orangeburg's new CA Conduit lays faster—costs less to install. In addition, there are no coupling cartons to handle, transport or store.

Orangeburg's new CA Conduit comes, at *no extra cost*, with a factory-attached coupling at one end and a standard 2° male taper at the other end. To join—CA's long, lightweight lengths are placed end to end—hammered home in a simple, one-step operation. Actual installations *prove* Orangeburg's new CA Conduit joins up to 26% faster!

What's more, because the attached coupling is *flush* with the outside diameter of the conduit, new CA Conduit is easy to handle and store in neat, even stacks. And with the new flush coupling there's no need to "stagger" conduit joints in the trench. That means less cutting and tooling time.

New CA Conduit—like the millions of feet of Orangeburg Fibre Conduit in use since 1893—has self-sealing joints and impermeable walls that make it absolutely watertight. Its smooth 100% fibre raceway adds years to cable life.

Specify new CA Conduit on your next job. This addition to Orangeburg's line is available in 2", 3", 4", 4½" and 5" sizes. Orangeburg's Standard and Nocrete Conduit with separate sleeve couplings are available as always. Orangeburg Manufacturing Co., Orangeburg, N. Y. and Newark, Calif.

ORANGEBURG MANUFACTURING CO.
A Division of The Flintkote Company, Manufacturers of America's Broadest Line of Building Products

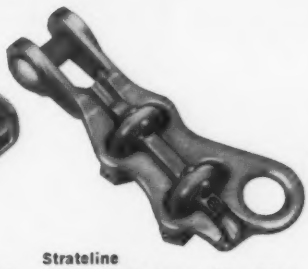
ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GRAYBAR
Everything Electrical Graybar

for deadends that last

choose from the O-B line-up

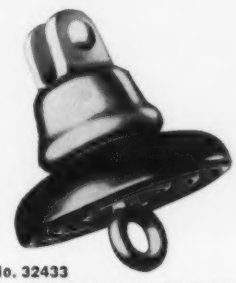
three new strain clamps and four dependable deadend insulators

Universal
New 88500 features spring that holds keeper-piece open during installation. Other models also offer excellent holding strength.

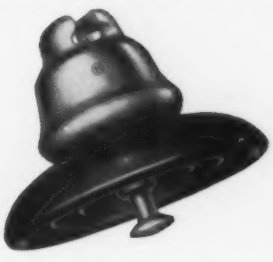


Strateline
Slim, easy to cover with rubber goods. Available in aluminum, bronze, malleable iron.

Cooline L-W
An aluminum quadrant-style clamp that provides transmission quality at distribution prices.



No. 32433
The favorite of most distribution men. Six inches in diameter. Millions in service.



No. 32434
Frequently used by distribution men who want to standardize on a ball-and-socket design for both transmission and distribution. 7½-inch diameter.

No. 32435
A 15,000-lb. M & E strength insulator packed into 7½ inches of diameter. The clevis-style counterpart of 32434.

No. 42399
A special design that is gaining rapidly in popularity. Just 4¼ inches in diameter, it is especially rugged and ideal for hot line work.

Ohio Brass

HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

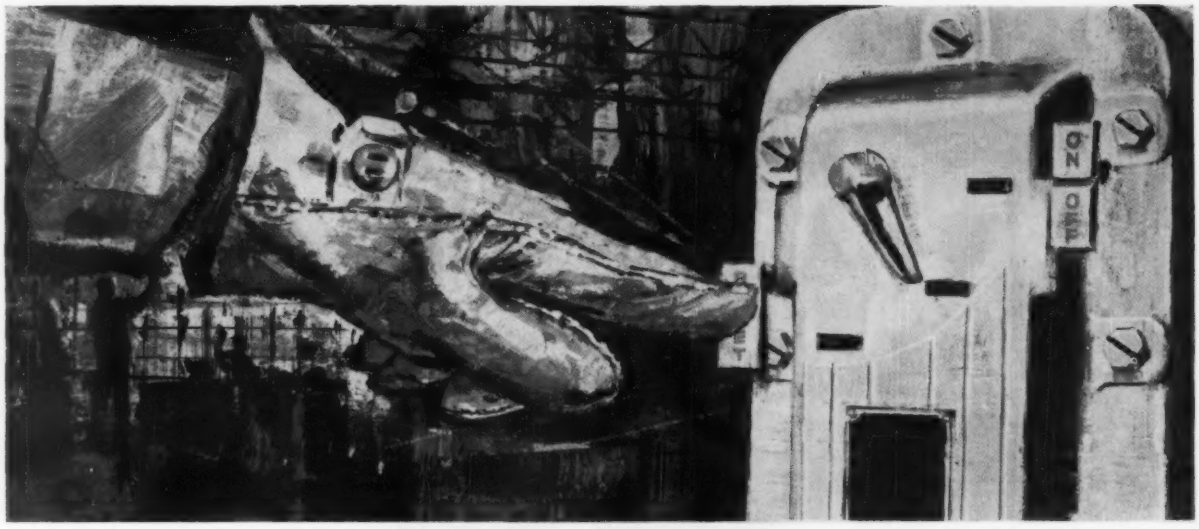
4975-H

TOP QUALITY PRODUCT

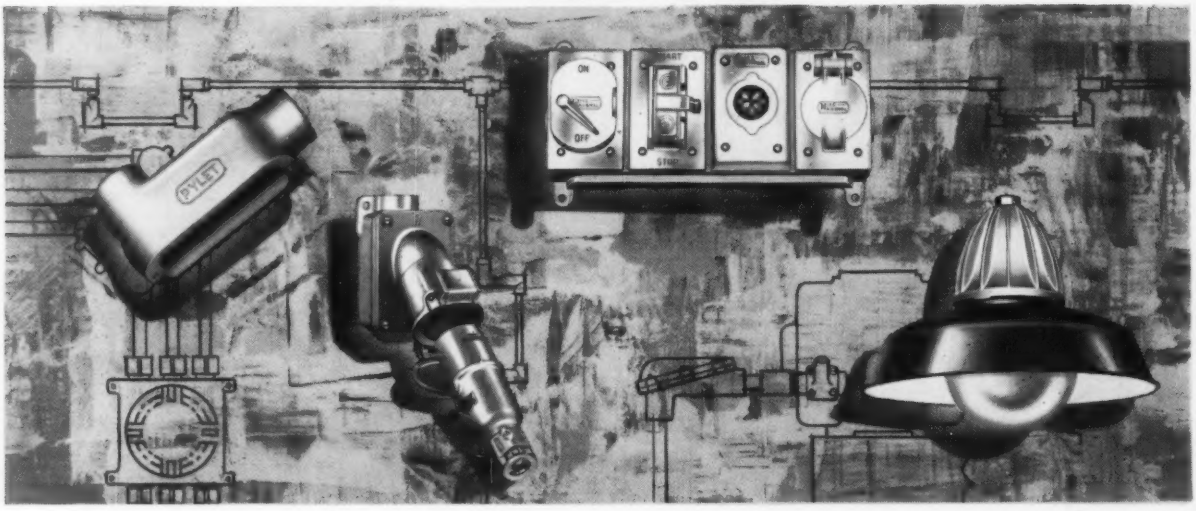
ANOTHER AVAILABLE FROM Graybar

Graybar Everything Electrical Graybar Electric Company

For protection of wiring and equipment



you can rely on PYLETS®



PYLET conduit fittings, circuit controls, lighting fixtures and connectors are second to none for quality and dependable service.

Built-in, environment-resistant features exceed code requirements, to meet the exacting demands of industry today—for both hazardous and non-hazardous locations. Cast metal fittings with taper tapped hubs, smooth roomy interiors and cadmium plating insure economical installation and maintenance as well as long service life.

Specify PYLETS. Sold Nationally through Authorized Distributors.

THE PYLE-NATIONAL COMPANY

SINCE 1897

WHERE QUALITY IS TRADITIONAL

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Branch Offices and Agents in Principal Cities of the U.S. and Canada
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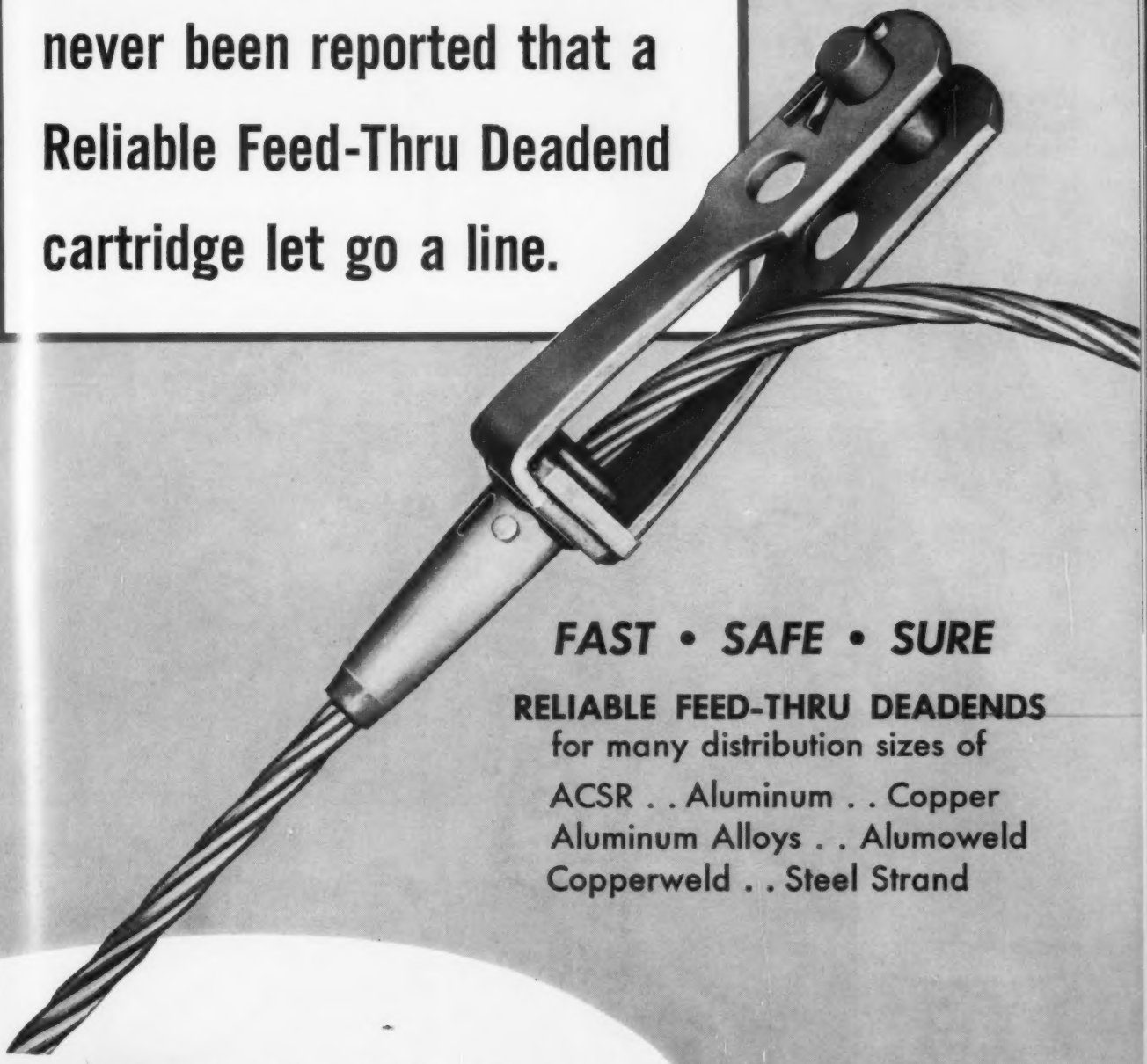
CONDUIT FITTINGS • SWITCHES • LIGHTING FIXTURES • FLOODLIGHTS • STEBER LIGHTS

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM GYRO

Otter Everything Electrical Grayban

During twenty-five years of continuing production it has never been reported that a Reliable Feed-Thru Deadend cartridge let go a line.



FAST • SAFE • SURE

RELIABLE FEED-THRU DEADENDS
for many distribution sizes of
ACSR . . Aluminum . . Copper
Aluminum Alloys . . Alumoweld
Copperweld . . Steel Strand

A HALF CENTURY OF SERVICE TO THE UTILITIES

Reliable ELECTRIC COMPANY • FRANKLIN PARK, ILL.
Hayes Steel Products, Ltd., Merritton, Ont.

Ideal for new construction, maintenance, change-over and hot line work.

TOP QUALITY PRODUCT

OTHER [illegible] AVAILABLE FROM GTY/BAR

Everything Electrical Graybar ELECTRIC COMPANY

RAY-O-VAC® HEAVY-DUTY

Industrial Flashlights and Batteries

"WORKMAN"
No. N22—2-cell
No. N32—3-cell
Shortproof industrial flashlight

N22W8
"WORKMAN" flashlight
with signal wand.

new RAYSOL added!

The Ray-O-Vac line of heavy-duty industrial flashlights and batteries has been specifically designed to meet the most rugged demands of modern industry. Always look to Ray-O-Vac to meet the needs for portable light.

ORDER TODAY FROM
YOUR NEARBY GRAYBAR BRANCH

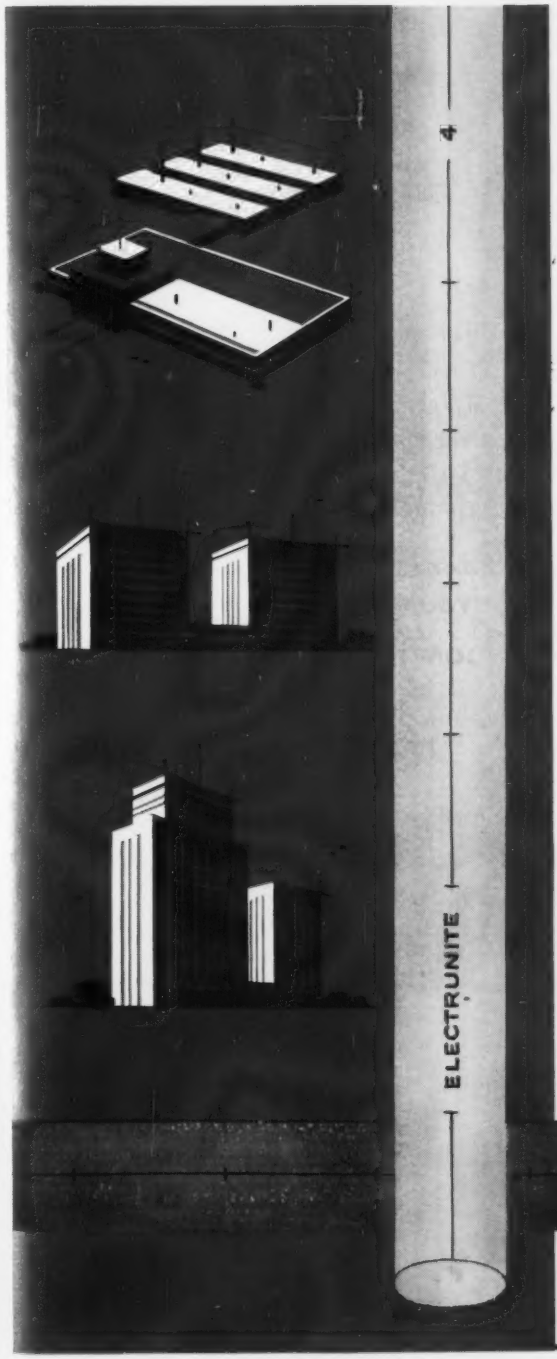
RAY-O-VAC COMPANY • MADISON 10, WISCONSIN
A Division of The Electric Storage Battery Company
Division Offices: 212 East Washington Ave., Madison 10, Wisconsin. 1388 Madison Avenue, Memphis 4, Tennessee. 461 Market Street, San Francisco 5, California. 1775 Broadway, New York 19, New York. Ray-O-Vac Canada, Ltd., Winnipeg.

941 Lantern Battery...Raysol additive extends shelf life; assures user of longer, more dependable battery service. Protects against leakage.

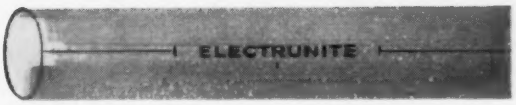
3LP Industrial Leak Proof Battery. Sealed-in-steel. Gives longer usable bright light. Guaranteed against corrosion damage to flashlights.

TOP QUALITY PRODUCT

ANOTHER AVAILABLE FROM Graybar



Republic ELECTRUNITE E.M.T. ...broad horizons to power planning

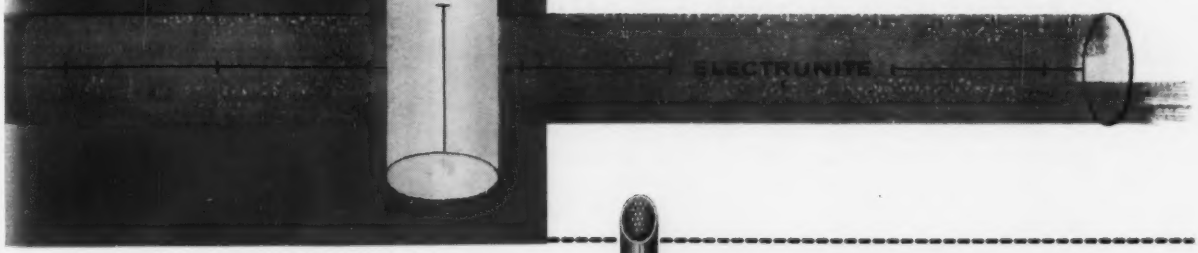


Republic ELECTRUNITE® E.M.T. economies in material and installation costs offer power-producing utilities load-building opportunities today, new horizons to power planning for the future.

With ELECTRUNITE, you get electrical raceways today to meet power needs today, and by specifying the next larger size provide for tomorrow's greater load-building—at no greater cost. Economy is built-in, ready for tomorrow's service.

ELECTRUNITE meets local, state, national codes. Recommended by architects, engineers, builders. Proved on-the-job by millions of feet installed over the years.

Learn how ELECTRUNITE offers expansion room for tomorrow's loads at today's prices. Call your Republic representative, or write direct.



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STEEL AND TUBES DIVISION

REPUBLIC STEEL

Cleveland 8, Ohio

REPUBLIC STEEL CORPORATION
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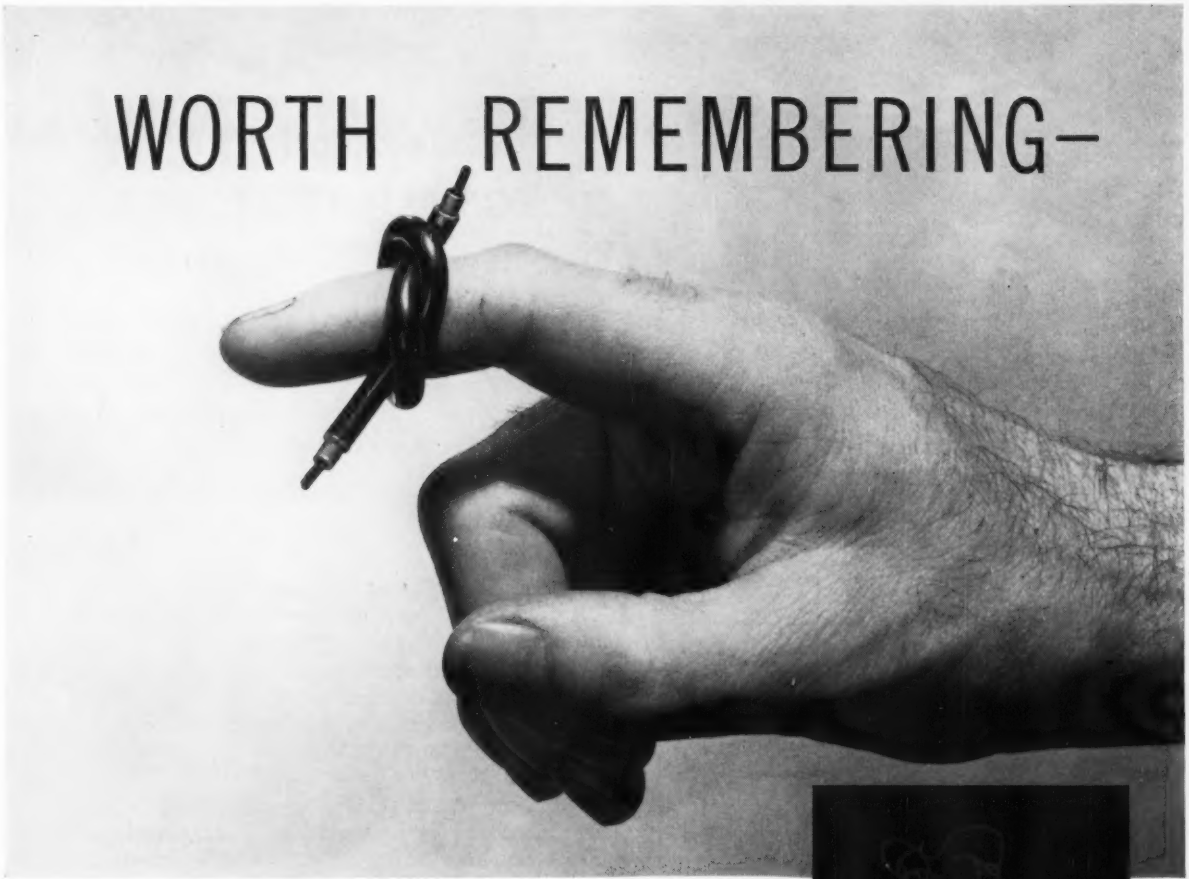
TOP QUALITY PRODUCT

Everything Electrical GraybaR ELECTRIC COMPANY

WORTH REMEMBERING—



TIREX®
is Incomparably Flexible!

The wonderful flexibility of Simplex-TIREX assures easy reeling, coiling and handling. But beyond this, TIREX offers other important features, too.

TIREX cords and cables are *cured in lead*, by an original process which results in a perfectly smooth, uniformly dense, abrasion-resistant rubber jacket. TIREX cords and cables are rugged, light, and easy to handle, and won't snag or tear. And their neoprene jackets give balanced resistance to abrasion, water, acids, oils, sunlight and flame.

Millions of feet of TIREX are in use everywhere—on the job transmitting power for mobile mining equipment, construction machinery and portable tools of all types. Investigate how Simplex-TIREX cords and cables can help you.

Simplex WIRE & CABLE COMPANY
79 SIDNEY STREET, CAMBRIDGE 39, MASS.

LIVE BETTER ELECTRICALLY

TOP QUALITY PRODUCT

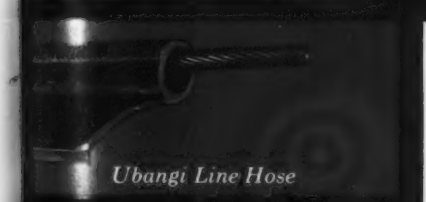
ANOTHER AVAILABLE FROM Graybar

Graybar Everything Electrical

PROTECT LINEMEN WITH SALISBURY UBANGI SYSTEM!

NEW one-man application with hot line sticks

New! One-man applicator for Ubangi Line Hose, Connectors, Hoods and Blankets. Fits all universal sticks. Adjusts to any working angle.



Ubangi Line Hose

Ubangi Insulator Hood

Line Hose Connector

Ubangi System is Flexible . . . Economical
Non-Breakable . . .
Easily Stored . . . Corona Resistant

The trend toward higher distribution voltages creates a demand for special protective equipment to provide linemen temporary insulation against contact with energized circuits. Salisbury's Ubangi System, of new Salcor compound with Hypalon synthetic rubber, provides the dielectric strength, corona resistance and flexibility to meet this need. Lock Lap lips prevent accidental dislodgement of line hose. Rip-Grip construction securely fastens hose to insulator hoods and connectors. New applicator permits one-man installation of hose, connectors, hoods and corona-resisting blankets.

Write for descriptive literature and test values.

THE WORLD'S LARGEST MANUFACTURER OF LINEMEN'S RUBBER PROTECTIVE EQUIPMENT

W. H. SALISBURY & CO.

401 N. Morgan Street • Chicago 22, Illinois

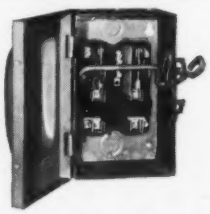
TOP QUALITY PRODUCT
ANOTHER AVAILABLE FROM GRAYBAR
Everything Electrical Graybar Electric Company

...in other words—I want safety switches with VISIBLE BLADES!

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't.* A lot of things can happen—and every one of them is bad. Personnel is in danger. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of these possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

NEW!
TYPE LD SWITCH



Quality Features at Low Price

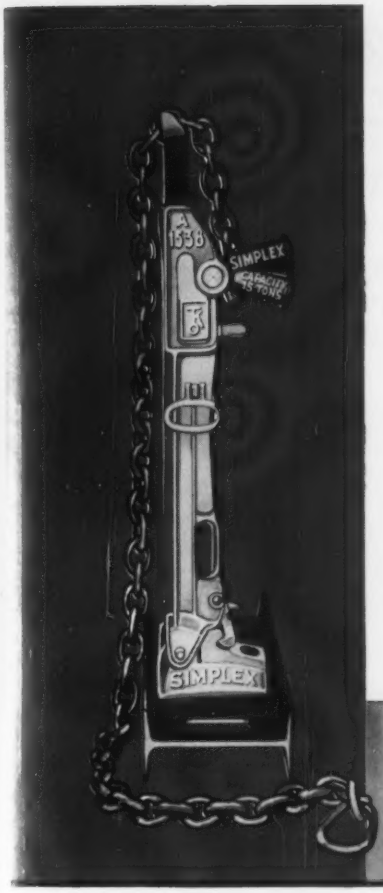
Spring-operated quick-make, quick-break • Box lugs — Easy to wire — No looping • Compact enclosure, yet lots of wiring space • Positive pressure (spring loaded) fuse clips • Full horsepower ratings

SAFETY SWITCHES and other Square D products are distributed by GRAYBAR

SQUARE D COMPANY

TOP QUALITY PRODUCT

ANOTHER AVAILABLE FROM Graybar



Pull Any Size Pole *Easier*-

with the ALUMINUM ALLOY SIMPLEX POLE JACK

15 Ton Capacity . . . . Weighs only 60 Pounds

Aluminum housing of the Simplex heavy-duty Pole Jack eliminates 35 pounds of weight, without sacrificing a pound of lifting capacity. You can pull or straighten poles, pull butts or move loaded poles without interruption to service—and without digging. Only 60 pounds in weight, it's easy to move from job to job; saves time and work. The husky "I" beam base gives a firm foundation; jack pivots on the base when pawl is disengaged. The A-1538 has 15-ton capacity and 22-inch lift. Comes completely equipped with new alloy steel chain and lever bar.

AERIAL CABLE AND WIRE TENSIONING JACK

Capacity 2 tons.

MANHOLE SHEAVE

Handles up to 3-inches diameter cable or any size winch line.

JUNIOR POLE JACK No. 325

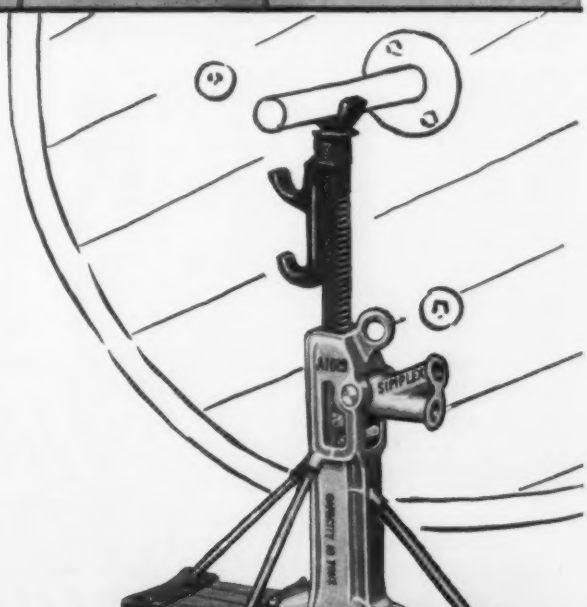
Pulls or straightens poles up to 30 feet high. 5-ton capacity.

Simplex ALUMINUM Reel Jacks

for safe handling of all reel sizes

No. A1029—Single Acting, 10 Ton Capacity. Aluminum alloy housing reduces weight 21 pounds. For outside work where footing may be uneven. T-shaped base has total area of 319 square inches, with three threaded and adjustable steel rods insuring a firm, non-rocking foundation. Furnished with left and right hand bases; Jacks are generally paired to keep operators in sight of each other for even lifting. Handles reels from 36″ to 84″ in diameter. Equipped with 3 lifting hooks 17″, 23″ and 29″, respectively, from ground level. Top hook for 3″ spindles, and the other 2 for 2½″ spindles.

Get full information now from your Graybar Branch, or write for Mechanical Catalog No. 58



No. A1029

WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

TEMPLETON, KENLY & COMPANY

2515 Gardner Road • Broadview, Illinois

TOP QUALITY PRODUCT

ANOTHER AVAILABLE FROM GRAYBAR

Graybar Everything Electrical GraybaR ELECTRIC COMPANY

Cut down installation costs with

Thor air or electric utility tools

AIR THOR NO.15 UTILITY HAMMER

Thor No.15 is an all-purpose tool which drills, chips or breaks concrete and masonry. Weighs only 14 lbs. Converts instantly from a self-rotating rock drill to a non-rotating hammer with a flick of an external cam lever. Free swiveling hose. Easy lubrication.

This lightweight air tool is really four tools in one. Thor's exclusive stop rotation gives you a light demolition tool, a drill, a light clay digger, a chipping hammer all in one compact tool. It's easy to handle, easy to use and mighty easy on air. Try it and prove its performance on the job.

ELECTRIC THOR U-100 HAMMER

If it's an electric all-purpose tool you need, Thor's U-100 hammer is ideal. The U-100 breaks up concrete or stone—gouges, cuts or shapes wood—chips and scales metal or paint—drills stone, concrete or brick. You can't afford to be without it on any installation job.

The Thor U-100 hammer is offered with a variety of accessories including: star drill, chisel, bull point, mortar chisel, bush hammer, scaling chisel, web cutting tool, flat wood chisel and wood gouge. This versatile electric hammer delivers a powerhouse punch that's no trouble to handle.

Thor
PORTABLE POWER
TOOLS

Ask your Thor distributor for a demonstration of the No. 15 Air Utility Hammer and the U-100 electric hammer. Also ask to see Thor's complete line of electric tools. Thor Power Tool Company, Aurora, Illinois

THOR POWER TOOL COMPANY, AURORA

Branches in all principal cities

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Grayb

Everything Electrical Grayb

Your guarantee of quality-

Triangle makes many types to one standard-

IT MUST BE RIGHT!

AIRPORT LIGHTING CABLE
CAA Specification L-824.

APPLIANCE WIRE
Thermoplastic, U/L.

ARMORED CABLE
Type ACT, U/L.

ARMORED LEAD CABLE
Type ACL, U/L.

BUILDING WIRE
All Types, U/L.

CATHODIC PROTECTION CABLE
Polyethylene Insulation, PVC Sheath.

CONDUIT
U/L. Rigid Steel, Hot-Dipped Galvanized or Black Enameled; Flexible Steel, Hot-Dipped Galvanized; EMT, Electro-Galvanized.

CONTROL CABLES
IPCEA. Rubber, Thermoplastic or VC Insulation; Braid, Neoprene, Thermoplastic or Lead Sheath.

FIXTURE WIRE
All Types, U/L.

SUBMERSIBLE PUMP CABLE
Rubber Insulation, Neoprene Sheath.

WEATHERPROOF LINE WIRE
Neoprene or Polyethylene Type.

NON-METALLIC SHEATHED CABLES
Types NM, NMC-UF, U/L.

PARKWAY CABLES
IPCEA. Rubber or VC Insulation; Lead or Neoprene Sheath; Flat, Plain Steel, Galvanized, or Steel Armor.

POWER CABLES
IPCEA. Rubber, VC, or Asbestos and VC Insulation; Braid, Neoprene, Lead Sheath or Interlocked Armor.

SERIES STREET LIGHTING CABLE
IPCEA. Rubber or Thermoplastic Insulation; Neoprene, Thermoplastic or Lead Sheath.

SERVICE CABLES
Service Entrance, Type SE Styles A, U. Type USE, Style RR Service Drop Type SD, Style SDC. Self-supporting Service Drop: Neoprene or Polyethylene Insulation; Rubber Insulation, Neoprene Sheath.

TREE WIRE
Rubber Insulated, Neoprene Sheath.

WIRE • CABLE
CONDUIT • PLASTIC PIPE
BRASS AND COPPER TUBE

TRIANGLE CONDUIT & CABLE CO., INC.
New Brunswick, N. J.

"It MUST Be Right!"®

Manufacturers of Arteries for Electricity, Liquids and Gases

TOP QUALITY PRODUCT

ANOTHER ➡ AVAILABLE FROM GraybaR

Everything Electrical GraybaR ELECTRIC COMPANY

Simplify interlocked armored cable installations

WITH NEW T&B FITTINGS

Each size of the new T&B Interlocked Armored Cable Fittings accommodates twice the previous range of cable sizes. They eliminate the problem of armored cable OD that is too large or too small for the fitting. The extra armor stop in T&B Interlocked Cable Fittings and the independently-bolted twin saddles make it possible to accommodate a wide range in armor diameters. The saddles are serrated for positive grip.

For dry or wet locations — T&B Armored Cable Fittings are available for both terminating in boxes or dead-ending, in both dry and damp locations. (Damp location fittings have a neoprene bushing, retainer ring and gland nut to keep out moisture.)

Other advantages: **1)** Fewer connectors are required to accommodate the full range cable sizes. Fewer items in stock. **2)** There is only one connector for each hub thread size. **3)** The basic connector and its accessories are engineered to achieve LOWEST INSTALLED COST.

All T&B products available only through authorized T&B distributors

THE THOMAS & BETTS CO.

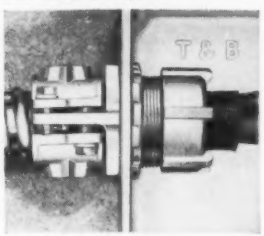
AUTHORIZED DISTRIBUTOR T&B ENGINEERED

14 Butler Street, Elizabeth 1, New Jersey
Thomas & Betts, Ltd.,
Montreal, P.Q., Canada

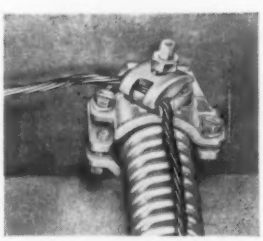
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

THE BASIC FITTING . . .

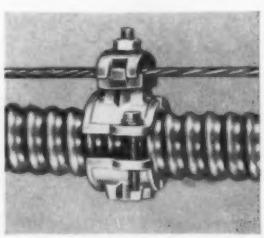
and T&B accessories readily solve specific installation problems . . .



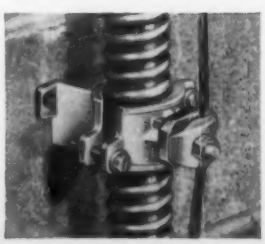
FOR WET LOCATIONS



FOR GROUNDING



FOR HORIZONTAL SUPPORTING



FOR VERTICAL SUPPORTING

For complete details, contact your local T&B distributor or write for Catalog 1A2.

ANOTHER TOP QUALITY PRODUCT AVAILABLE FROM Graybar
Everything Electrical Graybar

Cross Section of QUALITY

Seen in *cross section*, the Ionix Wall Convector reveals the quality and design that make it unique.

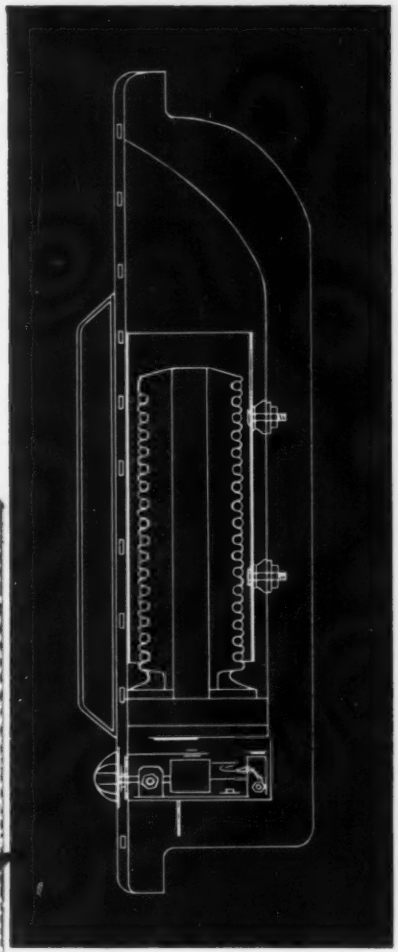
From the one-piece formed wall box to the baffled grille; from the exclusive stainless steel chimney construction to the exclusive Negative Ion Control — the Wesix Ionix Wall Convector has features found in *no other electric heater.*

Here is a heater with low front panel temperature and a heat distribution pattern that permits almost unrestricted usage even near work or play areas or in tight places where heater placement might otherwise be a problem.

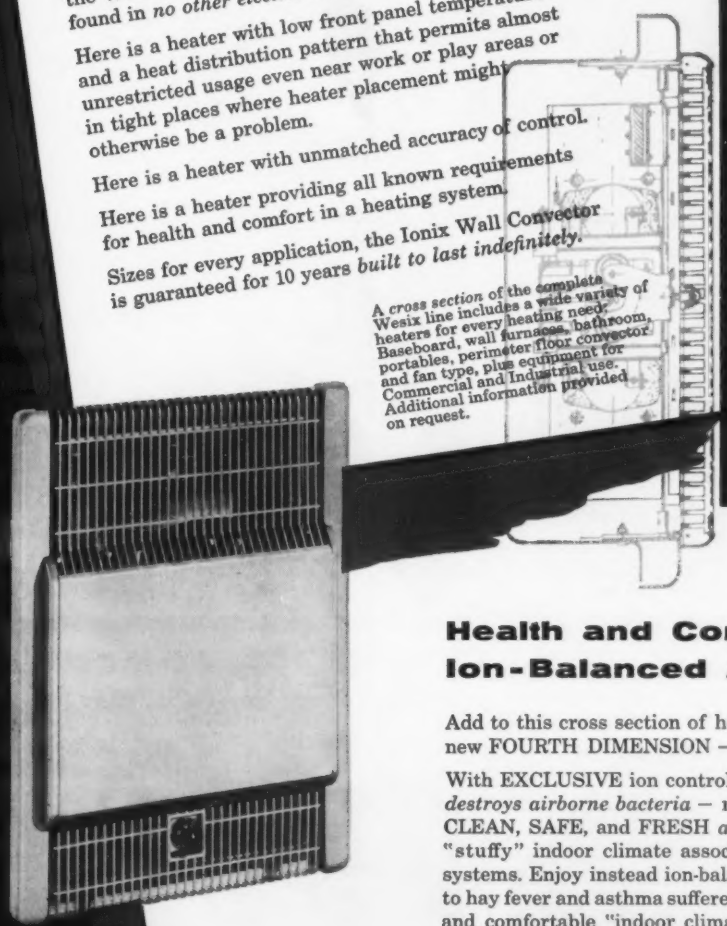
Here is a heater with unmatched accuracy of control.

Here is a heater providing all known requirements for health and comfort in a heating system.

Sizes for every application, the Ionix Wall Convector is guaranteed for 10 years *built to last indefinitely.*



A cross section of the complete Wesix line includes a wide variety of heaters for every heating need: Baseboard, wall furnaces, bathroom, portables, perimeter floor convector and fan type, plus equipment for Commercial and Industrial use. Additional information provided on request.



Health and Comfort from Ion-Balanced Air

Add to this cross section of heating comfort an exciting new FOURTH DIMENSION — ion control.

With EXCLUSIVE ion control, this Ionix Wall Convector *destroys airborne bacteria* — makes the air in your home CLEAN, SAFE, and FRESH *as all outdoors.* Gone is the "stuffy" indoor climate associated with old-fashioned systems. Enjoy instead ion-balanced air that brings relief to hay fever and asthma sufferers — means a more healthful and comfortable "indoor climate" for the whole family.

Your customers will be hearing more, much more, about Ion Balanced Air soon. Be ready with all the facts about THE GREATEST NEWS SINCE THE BIRTH OF ELECTRIC HEAT.

WESIX Wiredheat
AUTOMATIC *Electric* HEAT

WESIX ELECTRIC HEATER CO.
390 FIRST STREET • SAN FRANCISCO 5 • CALIFORNIA

TOP QUALITY PRODUCT

ANOTHER ... AVAILABLE ... FROM GraybaR

GRAYBAR Everything Electrical GraybaR ELECTRIC COMPANY

DAYSTROM-WESTON

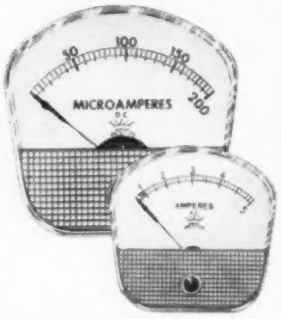
your <u>one</u> best source
for the world's finest

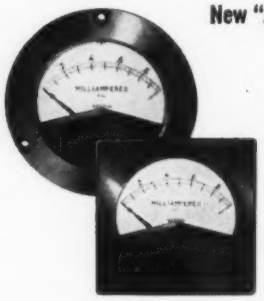
PANEL . . . PORTABLE . . . TEST INSTRUMENTS

PANEL INSTRUMENTS by Daystrom-Weston: fine instrumentation at economy prices. The full line includes these famous series:

The new "CROWN" line

A new 4½-inch series has been added to the 2½-inch Crown Line and the 2½-inch model is now offered as an A-C instrument as well as D-C. These handsome long-scale instruments also equipped with CORMAG® mechanisms. Case design permits all-around natural scale illumination. Ultra-modern styling to enhance the finest panels or equipment.





New "201" and "301" instruments

All 2½-inch "201" and 3½-inch "301" models now equipped with CORMAG self-shielded mechanisms . . . immune to magnetic intereffects . . . can be mounted interchangeably on magnetic or non-magnetic panels. Newly styled for improved appearance and readability in both round and rectangular cases.

PORTABLE INSTRUMENTS: designed and built in the exacting tradition of Weston engineering and craftsmanship. Among them, these popular models:

"904 GROUP" portables

Multi-range A-C instruments with self-contained transformers. Rated accuracies: 0.5% of full scale value. Easy-to-read, 5½-inch hand calibrated mirror scales, with knife-edge pointers. Exceptionally well shielded from external magnetic fields. Modern, all-bakelite cases with curved, wide-angle windows.

Model 633 CLAMP VOLT-AMMETERS

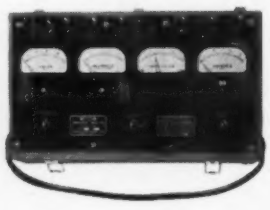
Measure A-C currents up to 2000 amps . . . 700 volts . . . assuring accuracies within 3% of full scale values. Their range, reliability and safety have earned their acceptance as standards by major utilities. Flexible potential leads are supplied as standard accessories. Also available — pocket size Model 749 — Type VA-1.

TEST EQUIPMENT by Daystrom-Weston: recognized standards of precision and stability. Science and industry rely on such advanced units as these:

Model 980 MARK II ANALYZER

Newly increased ruggedness and compactness distinguish this highly sensitive Volt-Ohm-Milliammeter. With high-voltage range extended to 4000 volts, offers D-C sensitivity of 20,000 ohms/volt . . . accuracy within ± 2%. Single dial control for range and function switching. CORMAG mechanism with spring-backed jeweled movement. Fuse protected ohm ranges.

Model 639 INDUSTRIAL ANALYZER



The most complete, self-contained portable analyzer available. Measures A-C current, voltage, power . . . in single and poly-phase circuits . . . also power factor in 3 phase, 3 wire, balanced circuits. Compact and lightweight, with all interconnections within the unit. Insulated for 1000 volt service. ± 1% accuracies for voltage, current, power factor . . . ± 2% for wattage.

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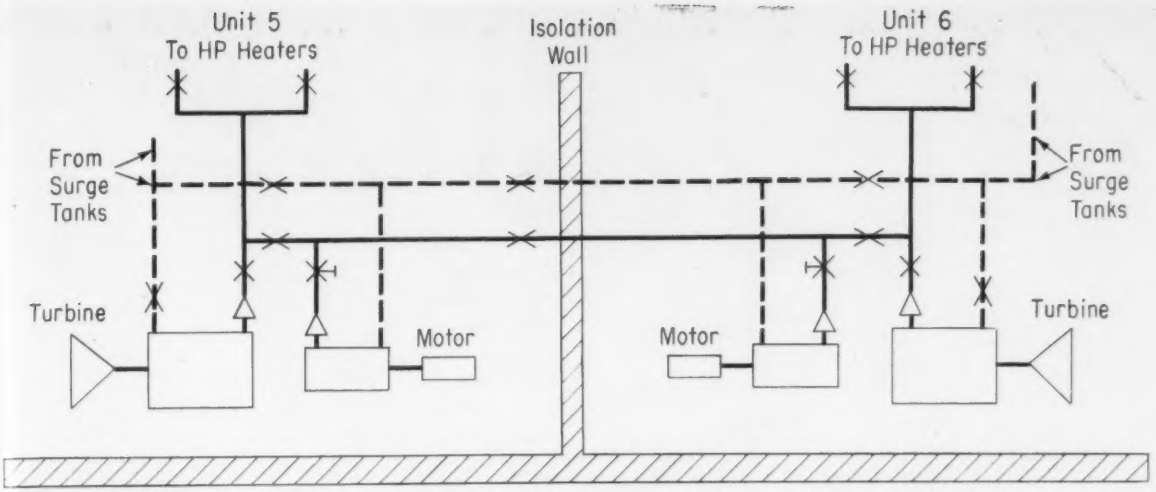

Fig. 1—**FULL-SIZE** turbine-driven boiler feed pumps with half-size motor-driven pumps on each of two adjacent units increases unit heat rate ½%, increases plant capacity 2% and provides 100% boiler-feed-pump standby

Station Raises Efficiency 0.5%

Full-size turbine-driven, half-size motor-driven BF pump with each of two 250-Mw units brings increased heat rate

An efficiency increase of 0.5% will be obtained by Wisconsin Electric Power Co through use of a full-size turbine-driven and a half-size motor-driven boiler feed pump with each of two units at Oak Street Station. The pumps will be installed with Unit 5 and future Unit 6. The turbines will be the low-pressure, condensing type, steam pressure on the main one being only 90 psig.

Each motor-driven pump will operate with its counterpart on the adjacent unit to make available a 100% boiler-feed-pump standby for each unit. This arrangement will cut station unit cost for each of the 250-Mw units by raising net station output 2% at a cost of only a 1% increase in boiler plant and turbine outlays.

An important advantage of the condensing turbine, boiler feed pump drive is the reduction of main turbine leaving losses. In effect, the exhaust annulus of the auxiliary turbine supplements that of the main turbine. As the later is usually limited and exhaust losses usually high, the larger flow area afforded by the exhaust annulus of the condensing auxiliary turbine reduces plant heat rate.

This gain will be 0.2% on the 240-Mw Unit 5. Added to it will be a 0.3% gain from the more efficient boiler feed pumping caused by elimination of auxiliary transformer and motor losses, use of an efficient pump turbine, and the preclusion of throttling losses of feed water to the 2,500-psi boiler. Plant heat rate vs that with typical motor drive will be lessened 0.5%.

Cost Increment Small

The half-size, motor-driven boiler feed pump will start and be used for low loads. It will team with an identical pump of the adjacent future Unit 6 to provide full standby when the turbine-driven pump is not available. Proximity of the pumps and the simplicity of their piping and valving will make the incremental cost of 100% standby negligible.

Upon sudden forced outage of the full-sized, turbine-driven pump, an operator will merely push a single control switch. This will start the motor-driven pump of the adjacent Unit 6 and operate six valves to put the nearby pump in operation for assisting in maintaining full load. This arrangement will pertain to Unit 6 also.

Because full-motor, instead of turbine, drive would require 2% of the generator output, net station output will be increased 2% by the turbine-drive plan. Boiler output and turbine input flow needs to be increased 1.5% to obtain this 2% higher net output. With incremental costs usually about 75% of base costs, the cost of the 2% increased net output will be about 1%.

A 3,600-rpm speed was selected for the turbine-driven pump, instead of a higher one, to avoid possible failure of a motor-driven "booster" pump, forcing water into the large feed pump. Gravity assures this flow. Regulation of feedwater flow will be by governor control, which dispenses with the usual feedwater regulating valve.

The pump turbine's condenser design and operation are simplified by tapping off the pressurized main condensing water supply, and by venting to the main condenser air pump. This auxiliary condenser's auxiliaries therefore will be limited to hotwell pumps, which are readily controlled remotely.

Turbine boiler feed pump drive appears the probable standard. Increased boiler pressure and output to double those now in use will result in about 30,000-hp pump turbines. Their efficiency, using only 90 psig steam, can approximate that of the corresponding portion of the main turbine. Gains with the larger pump turbines can be even greater.

25+

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The low-voltage protective system includes a "plus" breaker sensitive to top oil temperature, an easily-seen signal light, and a handy external reset handle.

And Delta-Star OSP's are built and precision-tested to EEI-NEMA standards.

The Delta-Star PROTECTION PACKAGE means you can use the OSP's full kva capacity . . . with no fear of overload damage . . . no need to "overspecify." And buying Delta-Star OSP's saves you the time and expense of installing and co-ordinating protective systems yourself.

NEW CATALOG. Complete specifications on the entire range of Delta-Star Overall Self-Protected Distribution Transformers are given in our new 20-page catalog. For your copy, call your nearest Delta-Star District Office, or write *Delta-Star Electric Division, H.K. Porter Company, Inc., 17th & Cambria Sts., Philadelphia 32, Pa.*

*OSP means Overall Self-Protected

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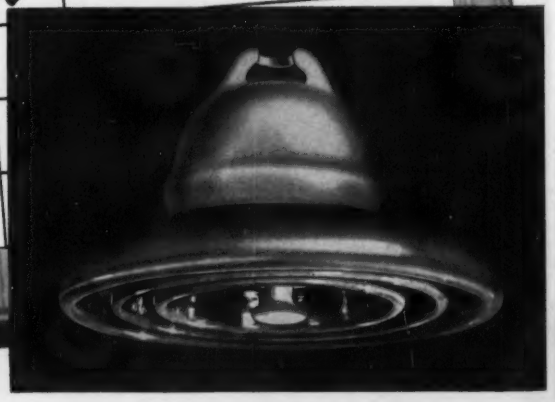

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For full catalog information on Delta-Star suspension insulators, write for publication #1000 to *Thomas Works, Delta-Star Electric Division, H. K. Porter Company, Inc., Lisbon, Ohio.*

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Where arresters are needed most,

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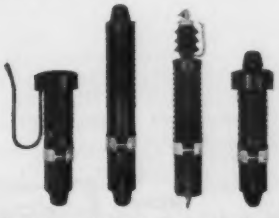
For the past three years, in those areas averaging sixty or more thunderstorm days a year, Delta-Star has sold the major utilities over half their distribution arrester requirements.

Why such a high sales record? Clearly, the low failure record of "Crystal Valve" Arresters, still tops in reliability after forty years as the standard of lightning-arrester performance.

Oxidized granular silicon carbide as the valve element keeps dependability high in "Crystal Valve" Arresters, prevents follow current and resulting line lock-outs.

NEW CATALOG. See the "Crystal Valve" principle and the complete line described in our new catalog. For your copy, ask your Delta-Star district representative, or write *Delta-Star Electric Division, H.K. Porter Company, Inc., 17th & Cambria Sts., Philadelphia 32, Pa.*



"Delta-Star makes a full range of "Crystal Valve" distribution arresters, 3kv to 18kv, with or without ground-lead separator.

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Manufacturers Literature

To request literature, use code numbers indicated for each item when filling in Reader Service form on page 126.

TRANSFORMERS . . . dry types, single and 3-phase, to 500 kva standard ratings and voltages. Essential design and operating data in Cat. 500, 28 pages, Hill Transformer Co, Inc, 1030 Washington St, San Carlos, Calif.

CABLE OPERATION . . . operating experience with high-voltage (above 7.5 kv between phases) paper-insulated cable, joints and terminations during 1956. Reported by 16 contributing companies which operated 18,955 miles of duct-lay cable. Joint report of Committee on Power Distribution, AEIC; and Transmission and Distribution Committee, EEI. Publication 58-18. Price to members and employees, 70¢; to non-members in U. S., $1.90; to foreign countries, $2.00. Edison Electric Institute, 750 Third Ave, New York 17, N. Y.

COMBUSTION CONTROL . . . systems for four major makes of pulverized-coal fired boilers. Listing of about 250 typical power plant and process industry installations. Bul. 510, 12 pages. Bailey Meter Co, 1050 Ivanhoe Rd, Cleveland 10, Ohio.

POLE GUARD SPECIFICATIONS . . . approved by Transmission and Distribution Committee, EEI. TD-12, 1958 to supersede TD-12, 1946, Edison Electric Institute, 750 Third Ave, New York 17, N. Y.

TIME CONTROLS . . . for automatic circuit control. Variety of switching devices, enclosures, typical wiring diagrams. Gen. Cat. 159, 4 pages. Sales Dept, Tork Time Controls, Inc, Mount Vernon, N. Y.

PHOTOELECTRIC CONTROL . . . describes street light control elements, hooks, and relays in GE's new line for outdoor lighting circuits. Bul. GEC-1524, 4 pages. General Electric Co, Schenectady 5, N. Y.

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(*Continued on page* 182)

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Figure 8 Pole & Bracket Cable

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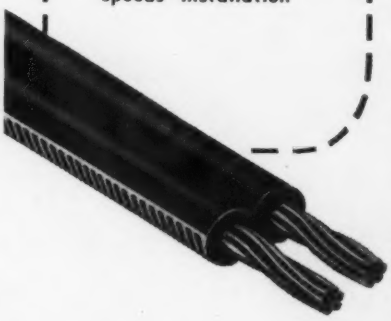

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search data. "A Study of the Effects of Corona on Polyethylene," Polychemicals Dept, E. I. du Pont de Nemours & Co, Inc, Wilmington 98, Del.

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MOTOR DRIVEN CRANES . . . underhung, single bridge, capacities of 1-10 tons, spans up to 50 ft. Speed of 75, 125, and 175 FPM are listed. For all floor controlled industrial applications. Bulletin DH-227-B, 8 pages. Wright Hoist Div, American Chain & Cable Co, Inc, 230 Park Ave, New York 17, N. Y.

TRANSFORMER IMPULSE TESTING . . . equipment used and method of testing Delta-Star transformers described in 4-page bulletin. Delta-Star Electric Div, H. K. Porter Co, Inc, 2437 Fulton St, Chicago 12.

INDUSTRIAL SIGNALING . . . log-book, provides examples of signaling devices—control, communication and protection equipment, others that contribute to increased efficiency and productivity. Color-indexed for quick reference, 44 pages, No. IN-1110. Edwards Co, Inc, Norwalk, Conn.

OPEN, DRY-TYPE TRANSFORMERS . . . for industrial and commercial applications, 300 kva and above, 601 to 15,000 v. Features inorganic insulation, aluminum conductors. Installation and maintenance information outlined, charts of electrical and mechanical characteristics. Bulletin GEA-6668A, 8 pages. General Electric Co, Schenectady 5, N. Y.

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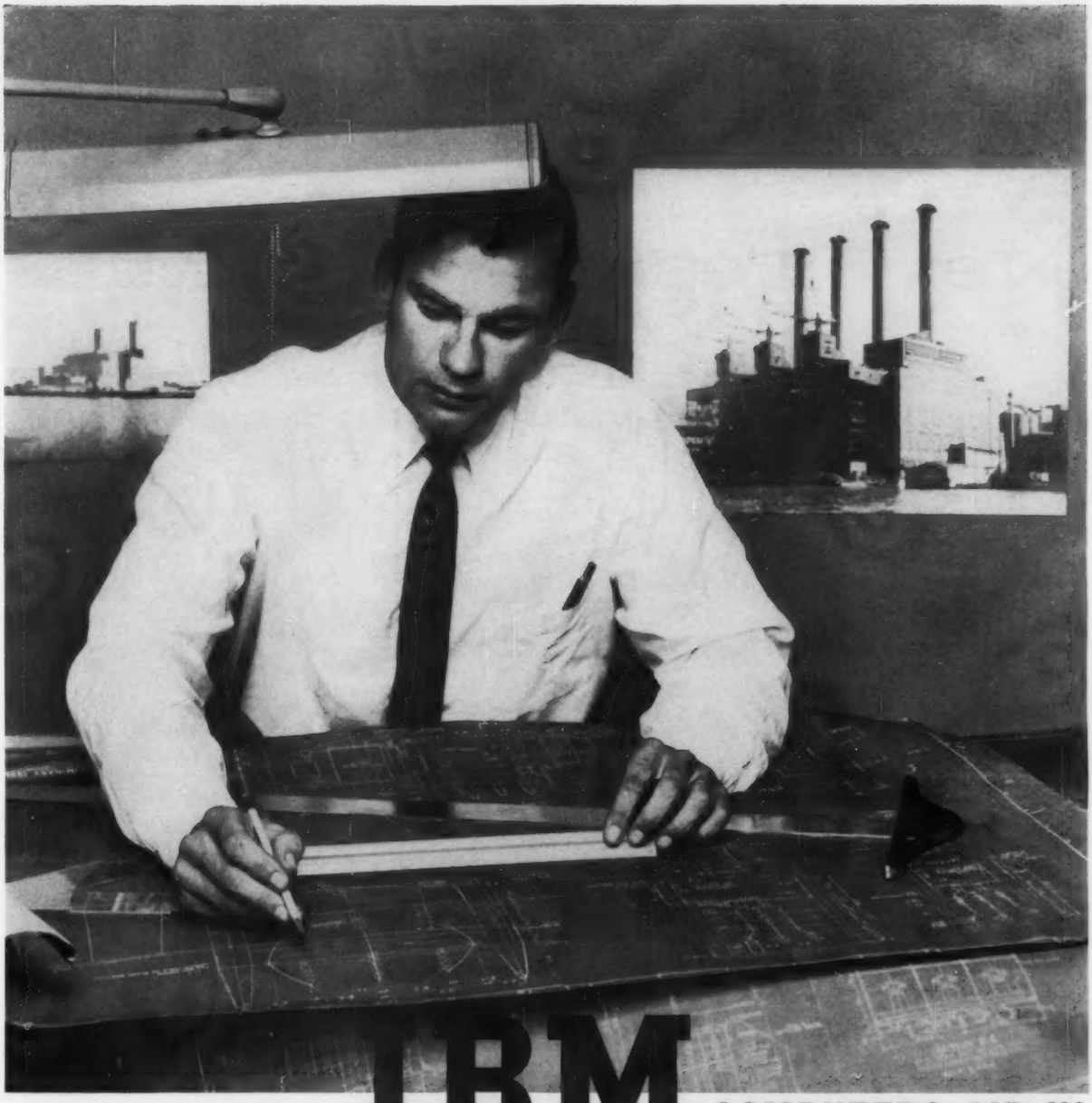

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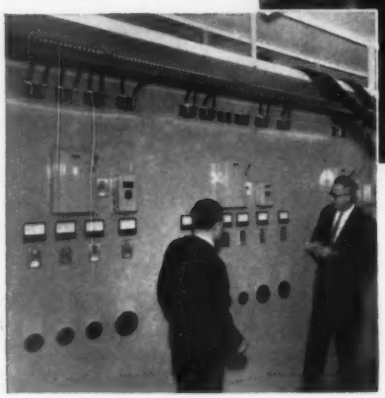
give accurate test data for utilities, precise evaluation of design ideas

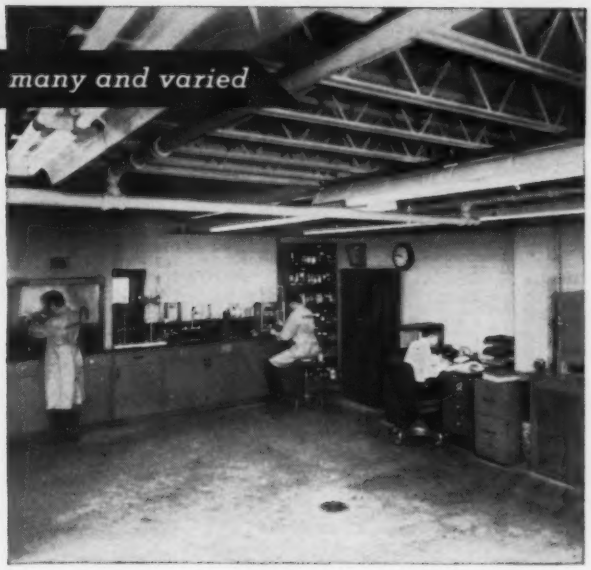


PART OF THE CONTROL PANEL of Blackburn's recently completed current cycling laboratory. John A. Toedtman, Chief Engineer (left), and Ken Way, Vice President, observe tests in progress.

NEW CURRENT CYCLING LABORATORY features virtually draftless air conditioning and a means of closely controlling ambient temperatures throughout the test area. Control of these factors permits truly precision testing of connectors. This photo shows Blackburn laboratory technicians taking resistance and temperature measurements of test connections. These new facilities permit testing of more than 500 connectors simultaneously. Advanced testing facilities like these enable Blackburn to provide you with the proper fitting for every operating condition.

. . . and the tests are many and varied

THE GENERAL LABORATORY, a portion of which is shown here, is the scene of a great variety of tests. Hardness, yield and breaking strength of parts such as castings, bolts, etc., are determined. Special equipment is available for pull-out or holding force evaluation of all fittings. Clamping force measurements giving the relationship between tightening torque and the force exerted by the connector on the conductor are made here. Microscopic examinations and special electrical resistance measurements are routine. Tests like these give Blackburn fittings great dependability.



THE CHEMICAL LABORATORY is the center for tests to control various chemical process solutions used in production. Electroplating, etching, and metal cleaning solutions are regularly tested here. In addition, special surface treatments are evaluated for friction control and corrosion protection. Thus, this laboratory assures continuous control of quality.

SALT FOG CHAMBER, where tests may continue for hundreds or even thousands of hours. Here salt fog tests are made on wire connections. Test conditions are made in accordance with ASTM specifications. Electrical resistance measurements and visual observations are recorded at regular intervals during the tests.

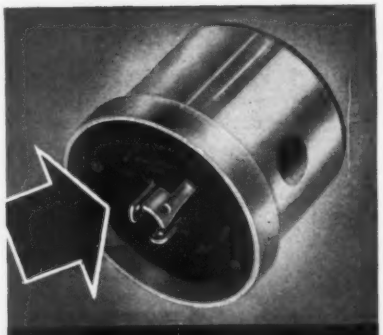
OUTDOOR EXPOSURE RACKS permit long-term exposure tests which often yield valuable information on weathering resistance not accurately obtainable from more highly accelerated tests. Specimens on these racks generally remain on test for at least a ten-year period.

Look to BLACKBURN for *test-engineered* electrical fittings

JASPER BLACKBURN CORPORATION

1525 Woodson Rd. • St. Louis 14, Mo. • WYdown 3-9430

announcing a development of major importance in TUBELESS controls...



EXCLUSIVE TERMINAL ISOLATION PREVENTS "ARC-OVER" TROUBLE

ANOTHER SUNSWITCH FIRST!

WRITE FOR DETAILS

SunSwitch DIVISION

RIPLEY COMPANY INC., MIDDLETOWN, CONN.

NAME _____

COMPANY _____

ADDRESS _____

Clip this coupon to your letterhead

Modern Kitchen Promotion Launched by Con Ed

A $200,000 Modern Kitchen promotion has been launched by Consolidated Edison Co of New York. It features a concept that divides the kitchen into four major appliance centers—cooking, laundry, refrigerator-freezer, and dishwasher-sink—and introduces the idea that kitchen planning can be done either in one operation or a step at a time.

A Kitchen Planning Kit is a major part of the promotion. The kit contains 44 scale models of elements needed to plan a modern kitchen, all representative of the various sizes of appliances and equipment on the market. When the customer decides on a kitchen arrangement, he takes it to a kitchen modernization dealer for final planning.

A kitchen modernization booklet, with sections on kitchens, lighting, wiring, ventilation and financing, and a directory, listing kitchen modernization and appliance dealers, have been prepared to assist in kitchen planning.

Additional promotions planned under the modern kitchen theme are a refrigerator-freezer promotion in June and a dryer promotion in October and November.

Give Better Electrically Spring Promotion Planned

"Give Better Electrically," a spring promotion to sell electrical gifts for Mother's Day, showers, weddings, and graduations, and organized by Live Better Electrically, will be spearheaded by a multi-brand advertisement in the May 2 issue of the Saturday Evening Post.

A two-month promotion at the local level will find utilities, distributors, retailers and participating manufacturers coordinating their merchandising efforts. Ten million lines of tie-in advertising are planned by utilities and retailers in support of program.

LBE reports that its 1958 Christmas promotion attracted heavy reader and utility response. A Starch report shows that 66% of the men and 81% of the women interviewed noted the Give Better Electrically ad. The survey also reported that 50% of those interviewed were interested in giving electrical gifts, and the same number were anxious to buy appliances for personal use.

Utilities backed the program with more than 10 million lines of advertising, and 497,000 booklet reprints of the GBE ad.

Westinghouse Has More Thermoelectric Devices

A portable, combination oven warmer and refrigerator, powered by a direct-conversion thermoelectric "motor" with no moving parts, has been developed by Westinghouse Electric Corp.

John J. Kelly, Jr., manager of the technology department, Westinghouse research laboratories, said, "Westinghouse plans to move into the thermoelectric refrigeration field in a big way." He indicated that purchase of these refrigerators will be possible next year.

Other thermoelectric devices produced at Westinghouse laboratories include a "teakettle generator," which can convert the heat of an ordinary gas flame into enough electric power to run a small motor and operate a radio; and an automatic bottle warmer or cooler, operating on regular house current, which can provide warm or cool milk at any desired time.

Air Conditioning Costs Drop Reported

Air conditioning costs are dropping, according to "Housing Trends," a news letter put out by Living For Young Homemakers Magazine. It reports that a new rule-of-thumb seems to be that average cost of installing a cooling unit in a new home is about $375 a ton. One ton is needed for every 600 sq ft of floor area, "assuming the house is well-designed and insulated."

In older houses, one major supplier has found the average cost of converting a heating system has been about $450 per ton of cooling capacity, the magazine reports.

Picture taken at tower #10 on the Duke Power Company's 230 KV line, River Bed Plant near Charlotte, shows the effect of chemical treatment of brush: left cut and not treated, right cut and treated.

Why the Duke Power Company uses Du Pont "Ammate" X in their chemical brush control program

"Our use of chemicals dates back to 1953-54, when we treated cut stumps following capital clearing. This was the beginning of our chemical brush control program, which now includes stump treatment (with "Ammate" X), foliage sprays, and spot treatment or basal application. 'Ammate' X has played an outstanding part in our programs as foliage spray, and as a stump treatment. We have found 'Ammate' X to be a very effective brush control chemical, and rank it with the best for all around mixed species control. Our brush control program continues, and 'Ammate' X will be one of our major tools in this program."

H. S. LEMMOND
Superintendent, Transmission Lines
Duke Power Company
Charlotte 1, North Carolina

Like the Duke Power Company, many users have found "Ammate" X weed and brush killer gives very effective brush control. "Ammate" X assures lower-cost, longer-term brush control because when the original spray job is done well, only occasional spot sprays are required to keep brush under control for subsequent years. "Ammate" X is the brush killer to use on rights-of-way that adjoin sensitive crops such as cotton, tobacco, tomatoes, soybeans, grapes, peanuts, since it presents no volatility hazards.

Around sub-stations, pole yards or wherever weeds and grass make maintenance difficult and costly, use Du Pont "Telvar" monuron or "Karmex" diuron weed killer.

This season, try new "Dybar" fenuron weed and brush killer. "Dybar" kills brush through root action. It comes in pellet form; for easy spreading, even in hard-to-reach areas. Recommended for use East of the Rocky Mountains.

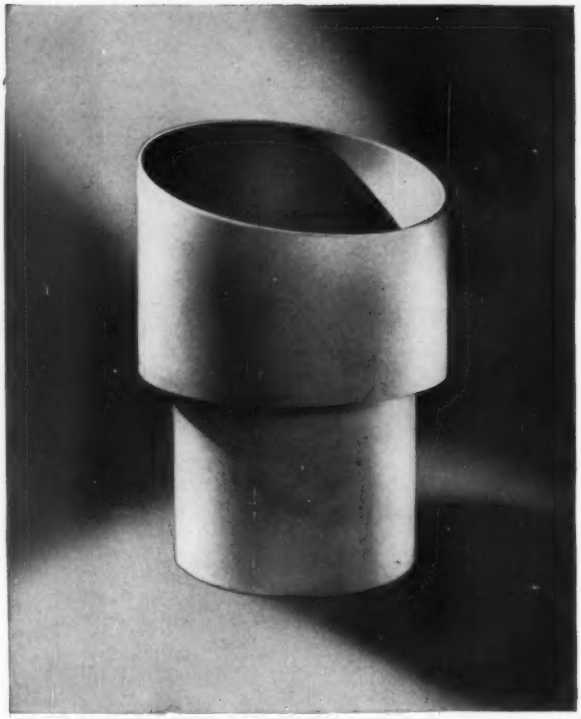
Du Pont weed control specialists are ready to help you choose the proper chemicals for an efficient and economical brush and weed control program. Write Du Pont, Grasselli Chemicals Department, D-4036, Wilmington 98, Delaware.

On all chemicals, always follow label instructions and warnings carefully.

DU PONT
REG. U. S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Weed and Brush Killers

AMMATE® X weed and brush killer
TELVAR® monuron weed killer
KARMEX® diuron weed killer
DYBAR fenuron weed killer



C D F HANDLES THE COMPLETE JOB An oil circuit breaker component is made from two Dilecto laminated plastic tubes, with a threaded ring joining the assembly. From raw materials to finish machining C-D-F does it all!

Utilities can depend on equipment containing C D F Insulating Parts

The reliable operation and long life of heavy electrical equipment often depends on insulating parts. A good supplier of insulation draws from past experience to make this possible—C-D-F has been a recognized industry leader since 1895! A good supplier expands his research and technical skill consistently—C-D-F offers the *widest range of electrical insulating materials*, from Vulcanized Fibre to C-D-F Products of Teflon.*

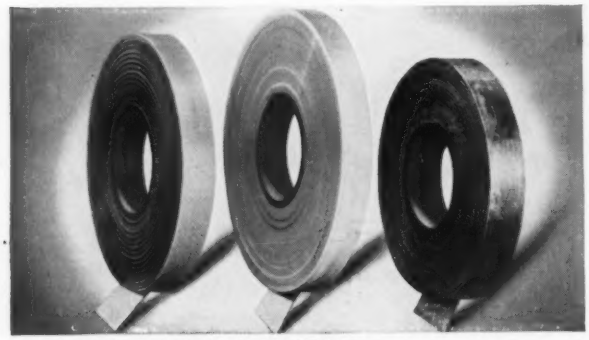
A BIG, RELIABLE SOURCE OF SUPPLY

As a buyer of Utility Electrical Equipment, you gain when your manufacturers work with C-D-F. Quality and dependability of electrical insulation, at reasonable cost, are guaranteed. The latest technical advances and ideas can flow freely between you and C-D-F's engineers. This page shows only a few of the many products C-D-F makes and fabricates for the electrical industry. Consult Sweet's Design File for catalog information, or call your C-D-F sales engineer (sales offices in principal cities)—you'll find he's a good man to know!

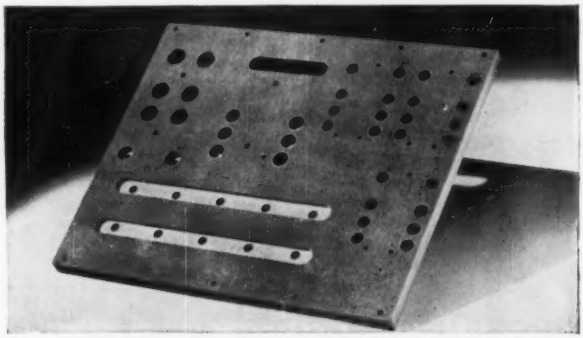
*Du Pont Trademark

CONTINENTAL-DIAMOND FIBRE

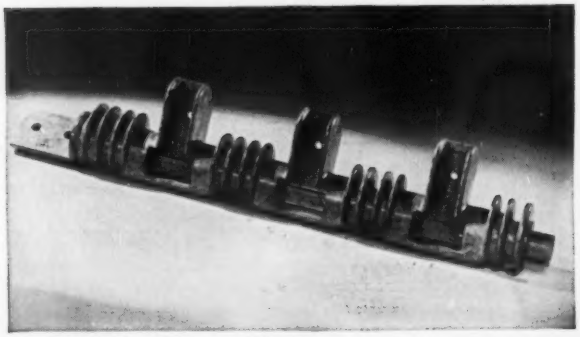
A SUBSIDIARY OF THE Budd COMPANY • NEWARK 15, DEL.



C D F MAKES FLEXIBLE INSULATION To meet critical high heat and electrical insulating needs, C-D-F makes these efficient, easy-to-apply tapes. Size range is wide, with latest resins and backing materials used. Write for samples and technical bulletins of Silicone, Teflon, and Micabond tapes.



C D F UNDERSTANDS THE ELECTRICAL INDUSTRY'S NEEDS Precisely machined to close tolerances, Dilecto panel boards guarantee dependable insulation, help designers save space. New C-D-F Dilecto catalog is yours for the asking, lists all new grades.



C D F MOLDS MANY SPECIALTIES This shaft insulator for a circuit breaker is molded from C-D-F's cloth-based industrial thermosetting plastic, Celoron. Note complexity of mold, clean detailing. Celoron has high impact strength, is used in switchgear.

C D F GIVES YOU BETTER MOTOR AND GENERATOR INSULATION All these built-up and bonded mica products are made by C-D-F to provide uniform high-heat resistance and dielectric strength. All forms of Micabond are made for better performance and lower costs.

A Key Link Between Utility and Supplier Is . . .

The Utility Purchasing Agent

Report on
Purchasing

Electric utility purchasing agents are among the biggest spenders in industry. As a group they buy an estimated $5 billion worth of fuel, material, and equipment each year. In the next ten years, according to industry forecasts, electric utility purchasing departments will spend well over $60 billion.

The effects of prudent purchasing are not hard to visualize when you play with figures of this size. The actual overall savings made possible through careful attention to the timing of purchases, acquaintance with the various suppliers, transportation, handling and storage are obvious. This places the purchasing agent in a most strategic position among electric utility management men.

What kind of man is the PA? It's obvious that his job calls for a man with a better than average knowledge of economics, financing, accounting, engineering, and perhaps even a little mind reading. To gain an insight into his job and his approach to it, *Electrical World* editors recently made personal calls on a number of purchasing agents. The information that follows is drawn from the results of that informal survey.

The purchasing official views his job as an all-department function—one in which he must maintain close coordination with many departments—particularly Engineering, Operating, and Construction. These other departments evaluate the technical aspects of possible suppliers and their products. For many standard items, this evaluation is performed by a Standards Committee, which sets up lists of acceptable suppliers. For the large "special" items such as power production equipment and heavy apparatus, however, Engineering works closely with the Purchasing Department.

One purchasing agent summed up this coordination with other departments like this: "Purchasing doesn't initiate requisitions or approve requisitions. We suggest types of equipment, but don't specify as such. We make the final evaluation, but with the assistance of the Engineering and Operating Depart-

ments. The Standards Committee is responsible for getting the smaller 'repetitive shelf stuff' on the approved list in the first place. From then on, Engineering and Operating have a voice in buying, working with the Purchasing Department."

On big items, Engineering and Operating are in on the initial study and planning, followed by design and specification. They act in an advisory capacity thereafter, with purchasing action and decision left to the Purchasing Department. "But naturally, when dealing with generators and boilers, the president and other members of top management play a big part."

One utility makes a formal attempt to coordinate purchasing and engineering activities through an executive on the Engineering Department staff whose sole duty it is to ensure this coordination. Both departments agree that Engineering and Purchasing work in friendly, well organized fashion, and they attribute this in large measure to the coordinator system.

In this company, Purchasing initiates distribution equipment orders which can be triggered by the stores supervisors. Major power production equipment, however, is specified and bought by the engineering-construction firm having the steam plant contract, with the Engineering Department's review and approval. Purchasing stays out of it.

The approved bidder list for other heavy apparatus is monitored by both Engineering and Purchasing through the coordination system. The Engineering Department initiates the requisitions, but final evaluations and awards are made by the Purchasing Department in conjunction with the coordinator.

Once a product has been placed on the approved list, the purchasing agent must evaluate it against its competitors. Some criteria, such as price, ability of the manufacturer to deliver, etc., are known best to the PA himself. On others, such as the services offered by the manufacturer, he relies on Engineering and Operating for their thinking.

What Do PA's Expect from Suppliers?

Most important of these manufactures' services are application and design engineering, according to PA's interviewed. Said one: "More and more of the major companies have put equipment specialists into our area to work with our engineers. I like this. It's an important supplement to the regular salesmen's services. Handling as many different items as he does, you can't expect the regular salesmen to know everything about a certain piece of equipment."

Other kinds of manufacturers' assistance PA's look for: Good delivery service, installation service (particularly on heavy equipment items), and the various commercial services offered by the local sales representative. This commercial service isn't to be misconstrued as a favor-seeking or lunch-buying proposition.

"We don't care how pretty a salesman smiles," noted the PA of a large metropolitan company. "But we do care about what he knows and what he can do to keep us informed. How well a company works with us through its salesmen is what represents the company to us."

Purchasing officials also appreciate research & development and product innovation. While a minimum of R&D is essential to Standards Committee approval, ". . . work carried on by a manufacturer is usually a factor in selection of his make over another," one PA said. "All else being equal, the R&D-busy suppliers get the nod, and these factors are weighted into the bids where all else

is not equal." There seems to be general agreement on this point, but it's not unanimous: "We're not interested in the reputation a manufacturer might have for R&D. We're after results!" asserted one PA. Commented another: "R&D work is definitely a factor in our selection of a vendor; but this argument, I think, is being overworked. We do it on the basis of having our own engineers go to their plant and determine for themselves whether the new features are of value to us. I depend on our engineers for this information."

With distribution equipment, R&D is evidently not as important. As one PA put it: "This shelf stuff is pretty much standard now, regardless of who makes it." One notable exception is distribution transformers. Noted one PA: "Competition is so intense it seems every week there's something new coming out. There have been some tremendous strides here."

How Important Is Price?

All other things equal, price will be a major factor in selection and purchase, most of the PA's suggested. But product performance and efficiency are closely tied to this. Sample comments: "The two work together; both must be evaluated at the same time. It's like a Ford and a Cadillac. You don't pay the price for a Cadillac when a Ford will do the job. But if it's a Cadillac that's needed, then price becomes secondary." And one western utility cites the general feeling that the most efficient unit (of major power apparatus) is the cheapest in the long run.

How much price differential it takes to walk off with an order varies with the type and cost of equipment. PA's agreed that 1% on big ticket items like turbine-generators, boilers, and power transformers is well worth considering. But on distribution transformers, pole-line hardware, and other small items, price differential would have to be at least 5% to 10%. As one PA put it, "Ten percent would be the most usual breaking point. With that much difference in price, you've got to reevaluate your other considerations."

"It's tough to evaluate the things apart from price when you're dealing with heavy apparatus and distribution stuff," opined another. "To me, it doesn't make a difference if it's 1% or 15%. I really don't think you can evaluate fairly all the things necessary to decide whether a certain feature is worth a 15% or even a 1% difference in price. For instance, is it really worth paying a premium for a piece of equipment because we've had good experience in the past with it? Is it worth ump-te-ump percent to us for research and development? What is the true value of all this? They do have value, yes. But the assigning of a price differential would have to be arbitrary."

Another PA tied lead time and delivery to price through volume buying (bulking-up requirements): "I'm a strong advocate of combining requirements to put ourselves in a better bargaining position with the manufacturer. The method of committing ourselves for buying has changed radically in the past three or four years. Now, late in the year (around October or November) we determine what we'll need next year in heavy apparatus. Then I begin to look around. If conditions are right, I'll cover us for 90% of it in one fell swoop. We'll buy a large quantity of big breakers at once, get a good price, and delivery through the year as needed."

Once again tying lead time to price, one PA (a vice president) underscored the importance of his function in buying heavy equipment: "My job as a member of the management group is to watch closely the time schedules involved in obtaining equipment—and as a member of management, I know our future

needs. It's my job to keep in touch with everything affecting price, delivery, etc. When I feel it's time for us to move, I then sit down with other members of management to make a decision." In line with this, our query about present efforts by manufacturers to get utilities to buy well in advance of requirements brought this reply from another PA: "Committing yourself that far ahead for that much of an investment, you've got to be sure of a lot of things—financing, load growth, etc. Utilities are not going to stick their necks out any farther or any sooner than they have to."

Where Will Stocks Be Stored?

On distribution items, warehousing becomes a matter of concern to many purchasing agents, in connection with lead time and delivery. These fast-moving shelf items are usually wanted on short notice. Since most of them are bought directly from the manufacturer, the availability of local warehousing becomes a big selling point.

Not all PA's agree that local warehousing is necessary, however. Some utilities are trying to set up a commitment plan whereby pools of equipment are kept stocked in central distribution points. "We don't like the word 'local' or see the need for it," said one purchasing agent. "We don't foist on manufacturers the need for local warehousing or try to dictate where they put their stocks. We feel that demands like these only drive prices higher."

Instead of local warehousing, this utility makes awards to the manufacturer, after bids, to cover a four-month period with regularly scheduled delivery dates. Successful vendors have the understanding that they keep a large enough pool of items on hand to deliver, upon four days' notice, a normal one-month quantity of the item if necessary.

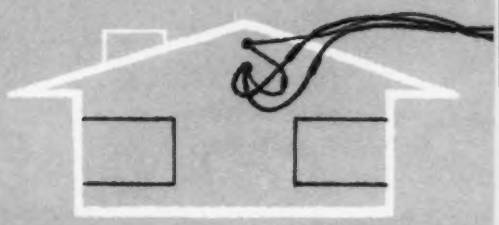
What does this practice mean to the utility? This PA contends it means the utility could cut its inventory, counting on the relatively firm backup of stock in the vendor's central warehouse. Also, in emergencies the utility can pull predetermined commitments from the vendor without specifying in detail. "In other words," he went on, "they know what we have on order, so we just say 'ship it.'" Benefits accrue to the manufacturer, too, the PA explained. This policy levels off the peaks and valleys in production, giving him a more efficient product run. Also it eliminates local warehousing, allowing the manufacturer to establish central warehouses to serve a number of customers at his own volition.

What Else Influences the PA's Decision?

Guiding the purchasing agent's operations are some basic policies (either written or unwritten). Most purchasing people require more than one supplier for a given type of equipment, because, as one PA put it, of the "vulnerability to strikes and other situations that would cut off the source of supply."

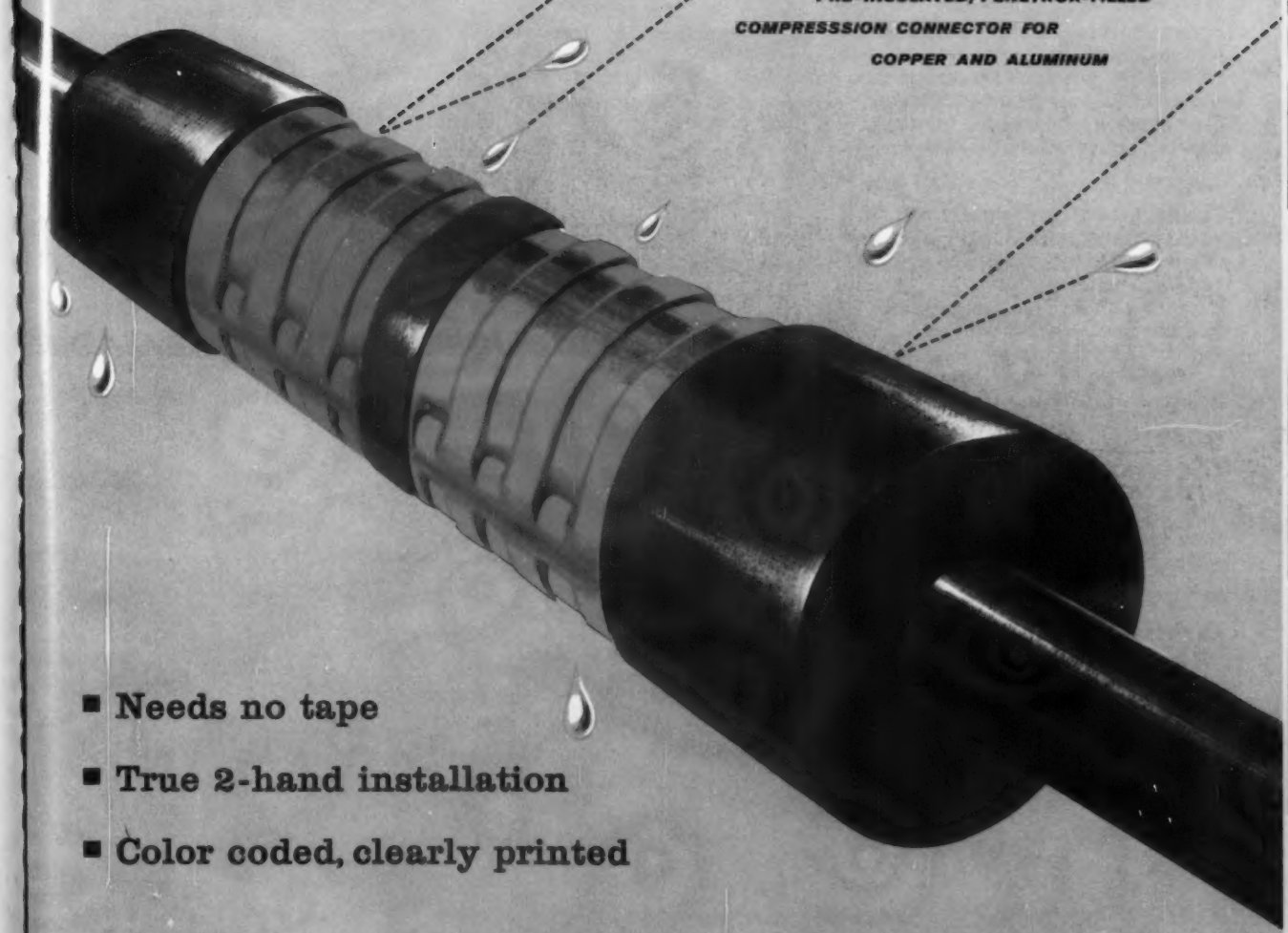
Many PA's like to favor manufacturers served by the company's own lines. "Public relations-wise, it just plain makes good sense," explains the PA of a small eastern company. And a large western utility goes out of its way to lend encouragement to small manufacturers in its service area—sometimes even making exceptions to its rigid requirements for inclusion on the approved bid list. Utilities are especially prone to encourage the small manufacturer when buying specialty items—those which larger firms either can't produce or don't seem predisposed to bother with. "A lot of new innovations have come about lately through the efforts of the small boys," one purchasing agent declares.

At last, a service-entrance connector that makes the lineman's job easier



INSULINK®

PRE-INSULATED, PENETROX-FILLED COMPRESSSION CONNECTOR FOR COPPER AND ALUMINUM



- **Needs no tape**
- **True 2-hand installation**
- **Color coded, clearly printed**

BURNDY

Making service entrance connections...

Probably more service entrance connections are made than any other type. But it takes time, skill and tape to complete them. INSULINK ends these problems. Nylon covered and polyethylene capped, INSULINK can be installed with standard crimping tools in three simple steps. Linemen will welcome the faster, easier installation... you'll welcome the time-saving economy, the neat, fully protected, electrically stable splices you get with INSULINK.

QUICK

Forget about taping when you connect service drop to service entrance with INSULINK, pre-insulated compression connector for copper and aluminum. Connectors are color coded for quick identification of conductor size range.

EASY

Clearly printed, easy to read, color coded jacket is marked to show catalog number, cable ranges, strip length, and where to crimp. Just strip... insert ... crimp with the same compression tool and grooves as for uninsulated splices. *The caps grip the cable ends and hold them in place for simple two-hand installation.*

SAFE

This quick, easy procedure makes service entrance connections that are fully insulated for protection of personnel, protected from water and weather, neat and attractive in appearance.

WIDE RANGE OF COMBINATIONS

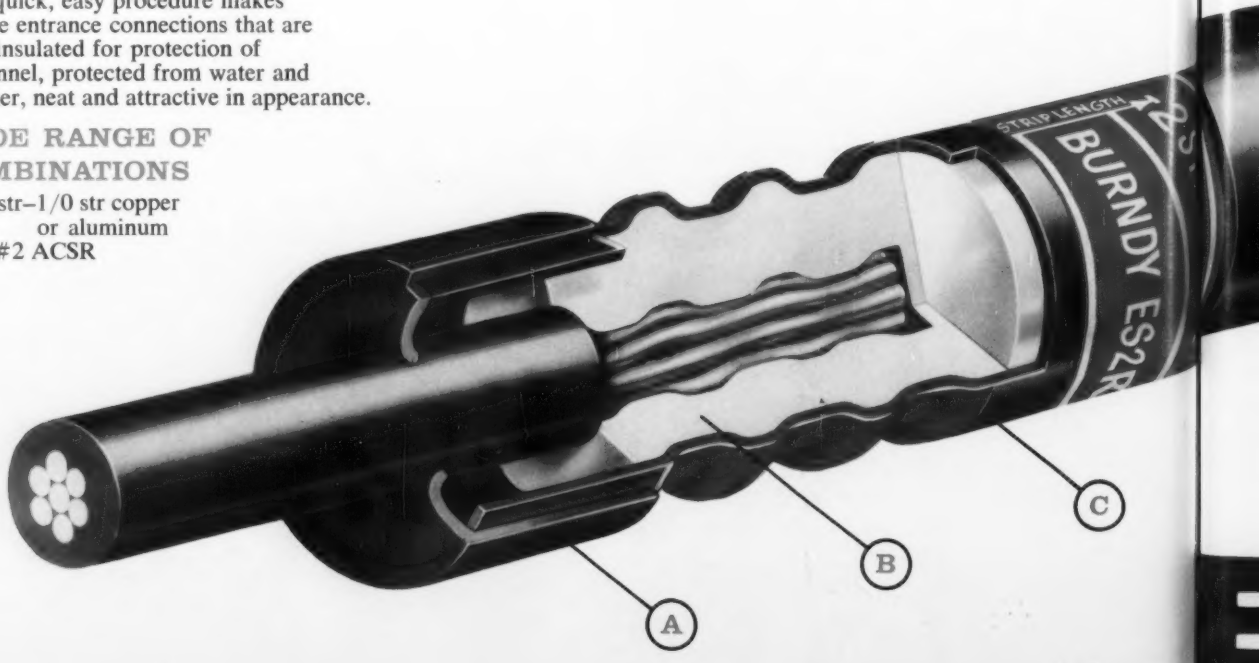
#10 str–1/0 str copper
or aluminum
#6–#2 ACSR

Strip back phase-wire insulation... arrows on INSULINK show how far.

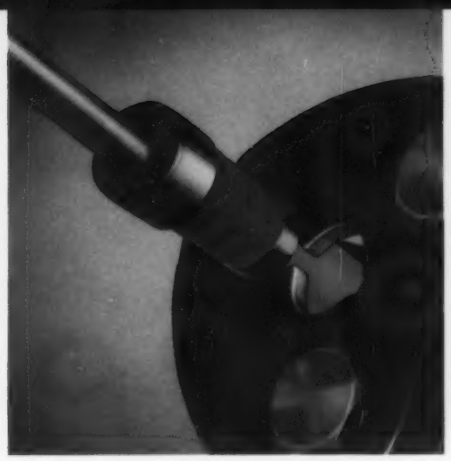
WHY SPLICE

INSU

pre-insulated service entrance



ws o**lasert** wire ends until they meet internal barrier. **caps grip and hold cable,** both hands are free for crimping.



Crimp with standard compression tool... guide lines on INSULINK show where.

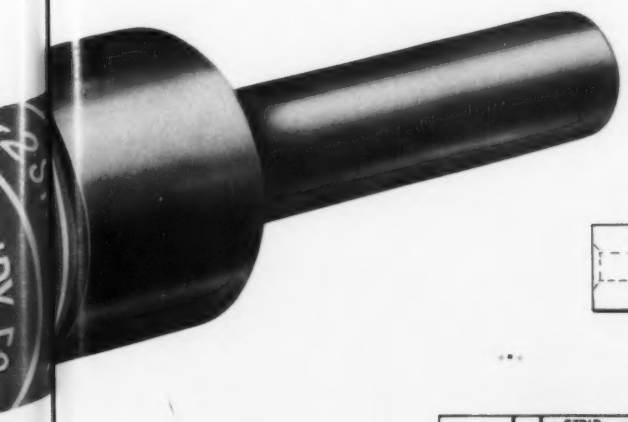
Installed INSULINK fully protects against accidental contact. Weather resistant... neat and attractive.

ND TAPE... *just connect with*

ULINK®

Patd. Other pats. pending

a*nnector for time-saving 2-hand installation*

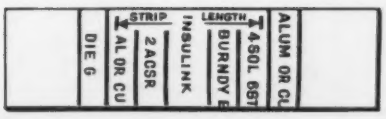


A

Polyethylene caps grip cable insulation securely, leaving lineman with both hands free for crimping... protects entire splice against moisture.

B

Aluminum sleeve employs mass anode principle, eliminates conductor erosion due to galvanic action; internal barrier separates conductors. Inner walls of sleeve have oxide film removed and are immediately coated before being filled with PENETROX.



C

Nylon jacket insulates connector electrically, protects it against water and weather. Standard tools crimp thru jacket without piercing it. Color coding shows range of cable sizes each INSULINK accommodates; arrow shows cable strip length; lines show where to crimp.

BURNDY

Exhaustive testing demonstrates dependability of service entrance connections made with...

INSULINK®

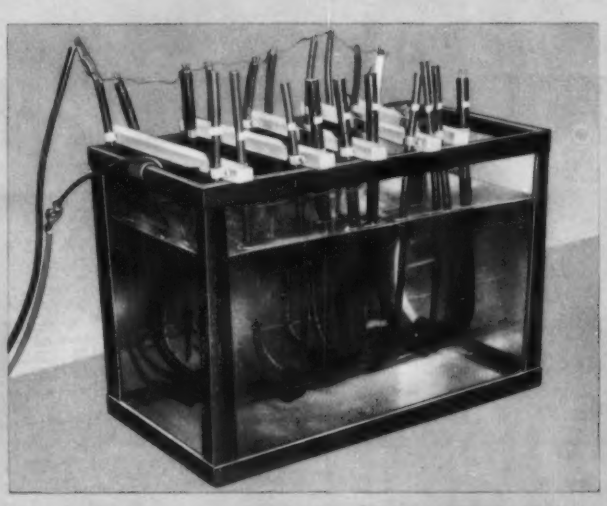
PRE-INSULATED COMPRESSION CONNECTORS FOR COPPER AND ALUMINUM

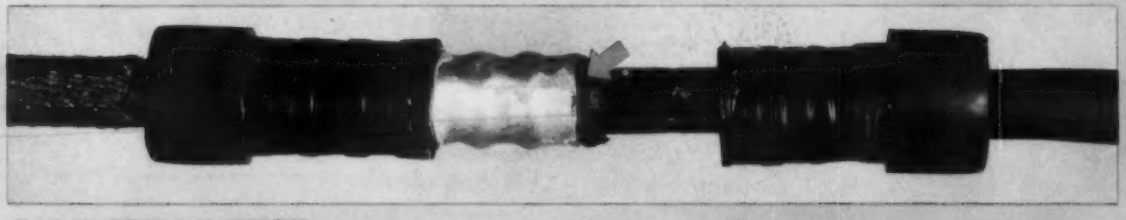
Connect services without taping—save time—trouble—make neater connections with full weather protection

IMMERSION TEST

demonstrates moisture proof connection and dielectric strength

Cable lengths connected with INSULINKS were immersed in 5% (by weight) salt solution and subjected to 1500 v for 1 min., in accordance with IPCEA requirements for service drop cable. Samples were tested after immersion for 1, 24, and 168 hrs. No leakage of current thru test samples could be detected, demonstrating (1) moisture proof connection, and (2) dielectric strength of INSULINK jacket and caps equal or exceeding that of cable insulation.





SALT SPRAY TEST **demonstrates connection is free from corrosion**

This unretouched photo shows installed INSULINK test sample with insulation removed from one side. There is no erosion of connector or conductor due to galvanic action; no accumulation of corrosion product.

Photo also shows how crimping action forces sleeve to butt against insulation and PENETROX to form ring that seals joint (see arrow) where cable enters sleeve. All INSULINK connectors are factory-filled with PENETROX joint compound.

CURRENT CYCLING TEST

demonstrates sustained electrical stability

After repeated current cycling, relative conductivity of connection remains stable at well over 100%. Test conditions were; cycling 1½ hrs on, 1 hr off at 170 amps, 125° conductor temperature.

Test on ES2R2W INSULINK #2 STR ALUM—#4 STR COPPER				
Relative conductivity after number of cycles				
Initial Conductivity	48	67	86	114
108%	107%	106%	106%	105%

FOR FURTHER INFORMATION WRITE:

BURNDY

58-31

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

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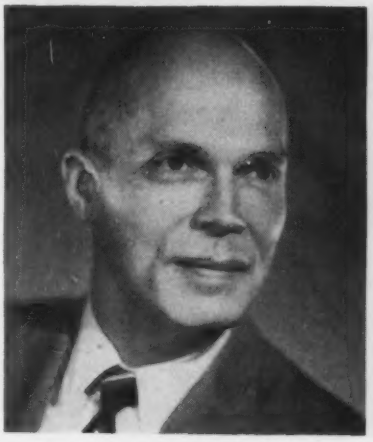
Thompson Named President of Iowa P&L

A. Paul Thompson has been named president of Iowa Power & Light Co. N. Bernard Gussett was made chairman of the board, a new post. L. E. Slade, formerly secretary, was named financial vice president, secretary and treasurer.

The promotion is the second for Thompson within three months. He was elected executive vice president of the company in January.

Thompson joined Iowa P&L in 1950 as vice president and treasurer. Prior to that he was with the Central National Bank of Cleveland, O. Between 1931 and 1950 he held various posts at the bank including investment analyst, auditor, and assistant vice president.

Gussett began his career as a cadet engineer for Stone & Webster and Electric Bond and Share properties. In 1925 he joined the San Antonio Public Service Co as assistant engineer. Moving up through the organization he became its chief executive in 1949. Later that year he resigned to accept the presidency of Iowa Power & Light Co.



THOMPSON

GUSSETT

Cresap Elected Chief Executive Officer

Mark W. Cresap Jr., president of the Westinghouse Electric Corp, has been elected chief executive officer of the company. Gwilym A. Price continues as chairman of the board. Simultaneously, he was named president of the Board of Trustees of the University of Pittsburgh.

Under revised company by-laws, Cresap, in his new post, has been assigned by the Board of Directors "general charge of the affairs of the corporation," and was designated "the officer through whom the Board delegates authority to corporate management."

Cresap first became associated with Westinghouse in 1949 when, as a member of the management consultant firm of Cresap, McCormick and Paget, he was retained to study the sales organization. He joined the company in 1951. He was elected executive vice president and deputy chief executive officer in 1955, and became president in January, 1958.

United Illuminating Names Dunn VP

Laurence A. Dunn has been appointed vice president in charge of Bridgeport operations for the United Illuminating Co.

At the same time he was appointed an officer of the company, along with Eugene Rosazza, assistant treasurer; Marshall F. Beebe, general superintendent; and Edward H. Walton, engineering and construction manager. Rosazza was also made comptroller in charge of customer accounting, plant accounting, methods and auditing.

Dunn has been the company's merchandising manager since 1945. He also supervises the company's advertising and publicity programs. He has been with UI since 1937.

(*More News About People on page* 198)

*

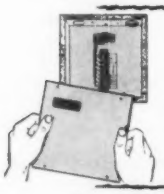
GTC

*an effective, economical industrial communication system designed to provide swift and sure voice communications regardless of distance or surrounding noise conditions.

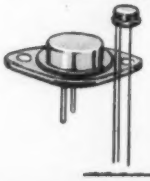
. . . THE UNITIZED COMMUNICATION SYSTEM . . .

COMPLETELY TRANSISTORIZED AND DESIGNED TO MEET THE CRITICAL REQUIREMENTS OF INDUSTRY

1. An effective, economical industrial communication system designed to provide swift and sure voice communication under adverse environmental conditions such as extremes of temperature and noise.



2. All amplifiers are "plug-in" contributing greatly to ease of installation and MAINTAINABILITY.



3. Transistors and rugged, industrial type components are used throughout. No vacuum tubes or "entertainment" type components of any kind are employed.

4. Central Control cabinet is eliminated thus reducing space requirement to a minimum.

5. ULTRA SIMPLE WIRING PLAN (no shielded cables) and UNITIZED EQUIPMENT with integral terminal facilities make for EASY LOW COST INSTALLATION and LATER EXPANSION.

* GAI-TRONICS TRANSISTORIZED COMMUNICATIONS

GAI-TRONICS
CORPORATION
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READING, PENNA.

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A SUBSIDIARY OF GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

Robbin Elected Head of Mallory International

Leon Robbin has been elected president of P. R. Mallory International Inc, a new subsidiary of P. R. Mallory & Co, Inc, which has been formed to manage Mallory's foreign activities and interests.

A vice president and director of Mallory, he will continue as an officer of the parent company. He was previously vice president in charge of engineering for the company in Indianapolis.

Other officers of the new company are: P. R. Mallory, chairman of the board; Hans G. Boehm, vice president; George Fotheringham, secretary; and Richard Lee, treasurer.

Stiffler Named I&M Commercial Manager

Nile W. Stiffler has been named commercial manager of Indiana &

Note how ordinary EMT split early in pressure test while induction welded CIRTUBE EMT (shown here unplated) held fast, surpassing UL requirements.

BETTER WELDING

on new CIRTUBE EMT means easier, split-free bending

THERE are many reasons why new CIRTUBE EMT will help you get faster, cleaner wiring jobs. Most of them are listed here.

One *big reason,* however, is *continuous induction welding*—by far the best technique available for making bead-free, split-free welds on high quality EMT.

It is virtually impossible to split an induction-welded EMT no matter how severe the bends. And the perfectly clean weld means uniform roundness—easier, neater bending without the slightest kink or flattening. Your men get it right the first time around.

Try induction-welded new CIRTUBE EMT soon as you can. Your wholesaler has it now—bundled with distinctive orange colored tape to identify the EMT manufactured to Circle's quality standards.

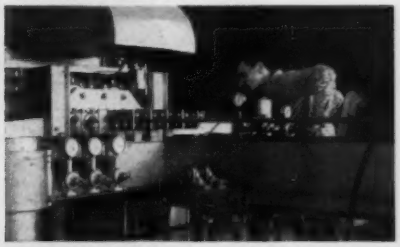
CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

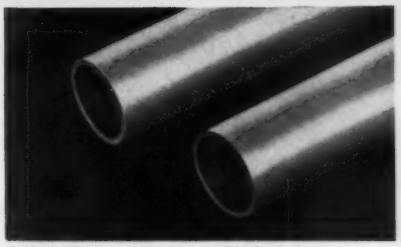
PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** in all principal cities
RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT *Ask for it!*

Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built in lubrication for easier wire pulling.





Lifetime exterior finish! Hard galvanized finish for durability; polished satin lustre for lasting good looks.

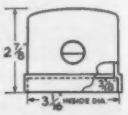
Automated quality control! Automatic controls assure complete and continuing uniform quality of product.

Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.

. . . WILL IT FIT?

The recently adopted EEI-NEMA standard, spelling out mounting specs for twistlock controls and their receptacles, should eventually prove a boon to everyone in the industry. Like any other well-thought-out standard, it can help make more controls and luminaires go together and work the way they should. Not the least of the benefits should be the elimination of a lot of force-fit remodeling and cussing up on the pole . . . We think the people who established this standard are to be congratulated.



As for the newest F-P control design, the tubeless 6600A Series, we're glad to say it complies fully with the new standard. The little sketch shows what 6600A dimensions are involved, and the photo shows the alignment of the CdS cell with respect to the plug blades. Since the standard also calls for an effective seal between the control and the luminaire head, we are now supplying 6600A's with a sponge rubber gasket on the base plate to do this job. To take care of luminaires designed for gasket-less controls, however, the pressure-sensitive stickum on our gasket permits quick and painless removal. (They're no good on mason jars, but work great balancing a coffee cup on your knee.)

If you're wondering how you can put controls on luminaires you now have in service and still make the installation conform with the new standard, maybe we can help. One of the numerous mounting styles or adaptors in the 6600A Series could be just the ticket. A call or letter will get the ball rolling. The Fisher-Pierce Co., 82 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

Michigan Electric Co.

A veteran of more than 37 years' service with I&M and its predecessor company, Stiffler has been the utility's Hartford City, Ind., district manager for the past 22 years. Before that he was Indiana & Michigan's commercial manager.

Boyes Elected VP of New Harper Subsidiary

Will W. Boyes has been made vice president of the new Canadian subsidiary of the H. M. Harper Co, Harper Everlasting Fastenings, Ltd. He has been with Harper in its Rochester, N. Y. branch for the past five years.

PERSONAL BRIEFS

Alabama Power Co has named **Alan R. Barton** as manager of the Western Division. He had been assistant to the executive vice president.

Frank M. Tait, honorary chairman of the Dayton Power & Light Co, has been presented with a plaque for his service to the Dayton area. He is a former president and chairman of the utility.

Robert M. Ginn, superintendent of heavy overhead construction for The Cleveland Electric Illuminating Co, has been named the "Outstanding Young Man of 1958" by the Cleveland Junior Chamber of Commerce.

(*Continued on page* 202)

For "small-job sealing"...

Johns-Manville

Duxseal

in the new handy pocket roll

THE NEW HANDY pocket roll makes Duxseal® ideal for small sealing jobs in both installation and maintenance work. It thereby increases the usefulness of your favorite all-purpose sealing and caulking compound.

The NEW pocket roll container allows quick removal and replacement of the compound. Its ribbon form makes Duxseal easy to apply in any amount, large or small.

3 types of Duxseal are now available in pocket rolls:

- **STANDARD DUXSEAL** is a permanently plastic gray-green compound utilizing a non-drying, vegetable-oil vehicle. It will not corrode metals, plastics, wood, rubber, or painted surfaces. It adheres well to all common materials. It is non-staining.
- **TYPE N DUXSEAL** has the same properties plus higher resistance to bleeding or dripping at high temperatures.
- **R-100 DUXSEAL** employs a resinous material as its vehicle and has the same properties. It skins fast to provide an excellent paint surface.

A wide range of other J-M Sealing Compounds is also available in pocket rolls. These are described in sheet EL-85A. Duxseal is covered in sheet EL-68A. Write Johns-Manville, Box **14**, New York 16, N. Y.

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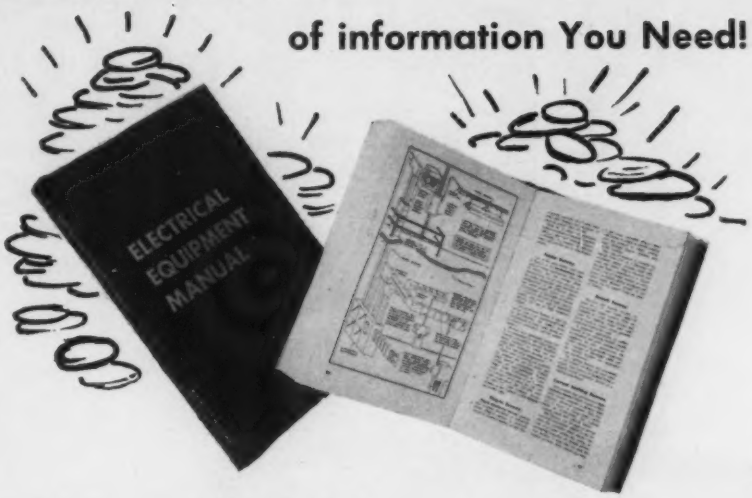
DUXSEAL

A GOLD MINE . . . of information You Need!



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Designed for use as an instruction manual or as a reference text . . . aimed at the practical interests of —

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ROYAL PRECISION

Electronic digital computer permits load-flow calculations on networks of up to 100 busses and 270 lines at lowest cost

Gives you optimum level efficiency in production, sales, purchase!

The lowest-priced complete computer you can buy, the versatile LGP-30 saves you time and money by 1) economically solving your load-flow problems; 2) forecasting optimum turbine-generator and boiler usage under varying conditions of system demand; 3) optimizing purchase and sales of power.

Now at work serving numerous electrical utilities, the compact, mobile LGP-30 operates from any convenient wall outlet . . . requires no expensive air-conditioning or installation. It gives you twice the capacity of any computer in its class, yet is by far the easiest to program in basic machine language.

Internal components of the LGP-30 have been greatly reduced to insure highest reliability. Operation has been remarkably simplified. Your personnel are quickly trained by Royal McBee without charge. Sub-routines and programs are available – as well as membership in an active users organization. Sales and service facilities are maintained coast-to-coast. For further information and specifications, write Royal McBee Corporation, Data Processing Division, Port Chester, N.Y. In Canada: The McBee Company, Ltd., 179 Bartley Drive, Toronto 16.

ROYAL McBEE · *data processing division*

More News About People

(*Continued from page* 200)

Stanley C. Killeen, who had been in charge of The Connecticut Light & Power Co's residential sales activities at Meriden, has been named to the newly created post of trade co-operation manager.

Austin E. Penn, executive vice president of Baltimore Gas & Electric Co, has been elected a director of the company.

R. Baxter Wilson, president of Mississippi Power & Light Co, has been elected a member of the Board of Directors of Middle South Utilities Inc.

The British Columbia Power Commission has completed its roster with the appointment of four men to the group. They are: **Frederick A. Smith, Arthur Lee, Kenneth Kiernan,** and **Ray Williston.**

Hugh L. Lancaster, Jr., has been named distribution and transmission engineer for Louisiana Power & Light Co, to fill the vacancy caused by the recent death of **W. L. Rush.**

G. Louis Shearer has been promoted to the newly created position of manager of purchasing and stores for Pennsylvania Power & Light Co.

Webster G. Whitman has been appointed chief district engineer of New England Power Service Co.

Charles R. Ross replaces **Oscar L. Shepard** as chairman of the Vermont Public Service Commission.

Gail B. Rathbun has been appointed engineering manager for electrical products at Westinghouse Electric Corp's Sunnyvale, Calif., division; **Richard F. Townsend** has been named to direct commercial engineering activities on large incandescent lamps at the Bloomfield, N. J., headquarters.

Keasbey & Mattison has made the following executive changes in the sales division: **D. W. Widmayer,** vice president and member of the board of directors, moves from director of sales to marketing consultant; **Norman L. Barr,** former

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Galvanized
STEEL
for the
ELECTRICAL INDUSTRY
is

DESIGNED
DETAILED
FABRICATED
PRE-ASSEMBLED
SHIPPED

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ACCURACY
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EXPERIENCED ENGINEERS, DESIGNERS, DRAFTSMEN, MODERN SHOPS

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P&K OUTDOOR LIGHTING REPORT

HOW TO LIGHT UP A YACHT CLUB MARINA

When the Richmond Yacht Club, Staten Island, N. Y., wanted to light their marina, they chose P&K CIRCLElux units for two good reasons. First, these units provided the desired light intensity. They added a big measure of safety to the marina at night. Secondly, the davit style standards were an architectural complement to the facilities. What's more, they'll keep their good looks too. Salt sea air is no problem for the all-aluminum units. They can't rust—they never require painting. It goes without saying that their natural light weight made installation fast and economical.

THERE'S AN IDEA HERE FOR YOU:

For marinas, shopping centers, or any industrial or residential lighting application, P & K CIRCLElux will meet all your requirements. The standards, available in a wide range of styles, and the luminaires, available in fluorescent, incandescent or mercury vapor, mean that you customize any installation with a "packaged" unit. You get both the lighting you need and the architectural beauty you want. Our new brochure LTG-30 will help you. Write for your copy.

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BRANCH SALES OFFICES: MIAMI, FLORIDA; BURLINGAME, CALIFORNIA
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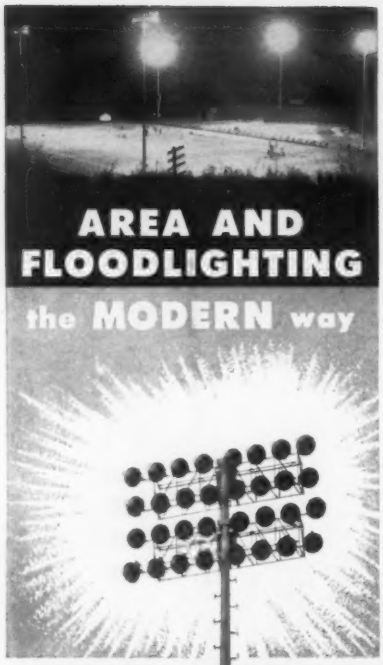

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the MODERN way

TULITO
TAPERED STEEL LIGHTING TUBES

For
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Engineered for Permanence, Strength and Safety...
Designed to accommodate from 2 to 40 lights.
Streamlined to enhance the appearance of any lighted area.

MEYER MACHINE, INC.
RED WING, MINNESOTA

general sales manager of the Asbestos-Cement Pipe Division, becomes general sales manager of the sales division; **James R. Reichel** succeeds Barr; and **John L. Prechek** becomes district sales manager of the company's San Francisco office.

Edward L. Ogden has been appointed manager of labor relations of The Babcock & Wilcox Co.

Wm. B. Ilko has been named sales manager, Wright Hoist Division, American Chain & Cable Co, in addition to his duties as sales manager of the American Chain Division.

Ronald V. Lints has been named advertising manager of Fischer & Porter Co.

Line Material Industries has appointed **Blaine Schultz** manager of engineering for Kyle Products; **Harold Stone** succeeds him as chief engineer for the capacitor and regulator line.

Thurman F. Naylor has been made sales manager of the Metal Products Division of Koppers Co, Inc.

O. M. Bundy has been named manager of the New Products Division of Clark Controller Co.

Thomas & Betts Co has appointed **Edward F. Finn** as sales promotion manager.

OBITUARY

Ernest A. Turner, 71, pioneer builder of transmission lines for Appalachian Power Co, died recently.

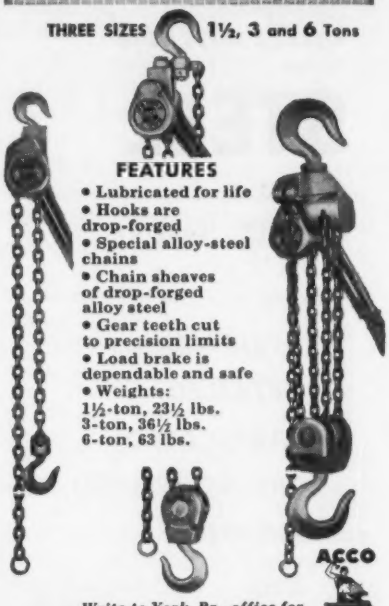
Glenn I. Page, vice president in charge of operation and construction for Public Service Co of Oklahoma passed away recently.

George R. Corey, 71, former executive vice president and secretary of the Utah Power & Light Co, died recently.

George H. Clifford, 77, an executive with Stone & Webster, Inc until his retirement in 1956, has died.

NEW WRIGHT
Type "C" Pull-A-Ways

THREE SIZES 1½, 3 and 6 Tons



FEATURES
- Lubricated for life
- Hooks are drop-forged
- Special alloy-steel chains
- Chain sheaves of drop-forged alloy steel
- Gear teeth cut to precision limits
- Load brake is dependable and safe
- Weights:
  1½-ton, 23½ lbs.
  3-ton, 36½ lbs.
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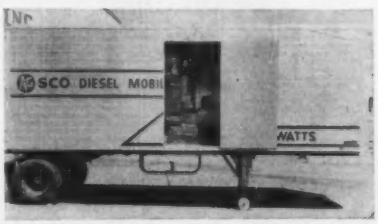
ACCO

Write to York, Pa., office for complete information

Wright Hoist Division
AMERICAN CHAIN & CABLE
York, Pa., Bridgeport, Conn.

Diesel-Electric power plant on wheels



Uninterrupted power under emergency conditions is now being assured throughout the state of Nebraska by operation of two power plants on wheels. Assembled as a full trailer unit, the plants are used during change-over of lines and sub-stations and during emergency weather conditions. Each unit contains a General Motors 450hp model 8-268A diesel engine and a Westinghouse 300kw, 375-kva electric generator complete with switchgear and radiator.

300kw power plants on wheels, manufactured by A. G. Schoonmaker Company, are available for immediate delivery and arrive ready to operate on all power requirements.

A. G. SCHOONMAKER COMPANY, Inc.
Foot of Spring Street, Sausalito, California
EDgewater 2-1490
50 Church Street, New York 7, N. Y.
Digby 9-4350

Texas Bill Would Prohibit Utility Sales of Appliances

A bill to prohibit franchised utility companies from selling appliances in Texas is awaiting action by the state legislature.

Sen Andy Rogers of Childress (pop. 7,619) said his hometown merchants want the bill as protection against West Texas Utilities Co, which serves towns in the area.

The company's dual role of merchandising appliances and selling electricity gives it an advantage over independent dealers, Rogers said. If they wished, he added, the company's salesmen could sell below cost.

"All the utility company would have to do is get permission to raise rates to cover their losses," he said.

C. L. Young, West Texas Utilities president, took issue with this view.

"We are opposed to SB 285 because of obligations we feel we have to our customers," said Young. "The majority of the towns we are privileged to serve are smaller communities, basically in the 3,000-5,000 population class."

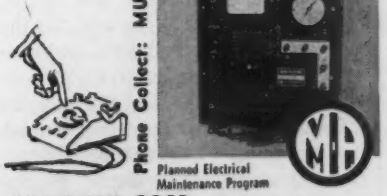
These customers depend on WTU for servicing appliances as well as the opportunity to buy new devices, Young declared. "In our large communities we seek to be a stabilizing influence in the electrical merchandising business by maintaining prices and terms that are fair and reasonable to the dealers and our customers, and we think we accomplish this to a considerable extent."

Bills similar to Sen Rogers' have been introduced unsuccessfully at past legislative sessions. The measure would apply to gas and electric appliances.

testing induction disc relays?

Phone Collect: MUrdock 8-7112

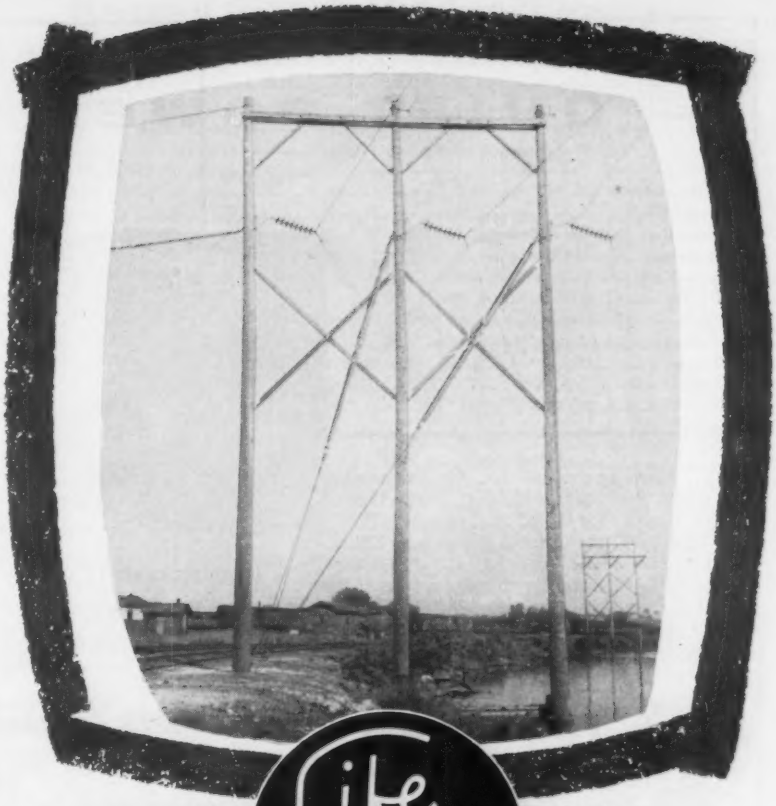
Test any protective device faster with Multi-Amp! Confines instrumentation to a single enclosure, greatly reducing "set-up" time. Safe and entirely portable. Get the facts from Jim Bates by phone or mail!



Planned Electrical Maintenance Program

MULTI-AMP CORP. LEHIGH AVE. / UNION, N. J.

"Continuous power for continuous production"

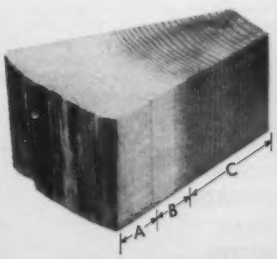


You can be sure when you install Life Span Western Red Cedar Poles!

. . . even where the most severe decay conditions exist

LIFE-SPAN'S thermal top-to-butt treatment permeates the ENTIRE sapwood . . . assuring longer pole-line service regardless of adverse installation or weather conditions. Besides being completely immune to decay, LIFE-SPAN Poles are clean, safe to climb and are carefully selected for uniformity and quality.

Want added years of pole-line service at far less per annum costs? Specify LIFE-SPAN Western Red Cedar Poles when you buy.

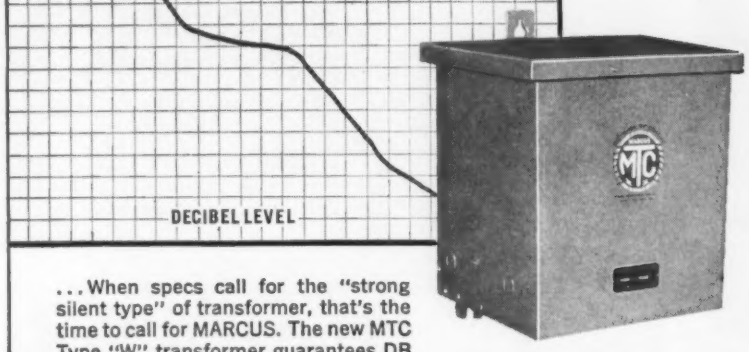


Actual laboratory tests **prove** . . . pentachlorophenal permeates both inner sapwood and outer sapwood the LIFE-SPAN way, making it impossible for the sapwood to decay under the most severe conditions. The above is a section taken from a Western Red Cedar pole after **years** of actual pole-line service under adverse conditions. It shows (A) the outer sapwood, (B) the inner sapwood and (C) the heart wood—all in perfect condition.

PAGE & HILL, Inc.

Minneapolis 3, Minnesota

QUIET POWER



...When specs call for the "strong silent type" of transformer, that's the time to call for MARCUS. The new MTC Type "W" transformer guarantees DB LEVELS THAT ARE BELOW NEMA STANDARDS. So for those extra quiet installations, Specify MARCUS---- Proven quieter by independent laboratory test.

- LOWER SOUND LEVELS
- LOWER WEIGHTS
- LOWER INSTALLATION COSTS

MARCUS TRANSFORMER CO., Inc.
RAHWAY, NEW JERSEY
"Mark of Quality"
Representatives in Principal Cities

A COMPLETE LINE OF DRY-TYPE AND LIQUID-FILLED TRANSFORMERS FROM 1 THROUGH 5000 KVA.

SAFETY and Satisfaction
The foundation of the Electromode exclusive safety principle is the Safety Grid heating element, a finned aluminum casting with all electric wires completely sealed inside. It has become famous through the years for its positive protection against fire, shock or burn.

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Longer Dam Gate Life Is Aim of Idaho Research

Special research has started at University of Idaho to seek metal combinations that will extend the life of control gates on irrigation and flood control dams. Financed by a $5,000 grant from Army Corps of Engineers' Walla Walla District, the study follows surface failure of some metal seats and bearing surfaces on slide gate installations.

One IU student, Vance Penton, has designed a measuring device which calibrates wear to 1/100,000th of an inch.

Bill to Bar Duplication Defeated in Washington

A bill supported by private utilities and opposed by Seattle City Light was defeated in Washington State's Senate late last month. The measure would have prohibited extension or rendering of electric service to consumers already served. Also, it would have barred construction of facilities to serve new consumers located near existing substations or lines.

City Light charged the bill was a "punitive action" aimed at preventing the system from serving a proposed industrial park and a shopping center near Seattle. Puget Sound Power & Light Co Pres Frank McLaughlin countered by saying the bill's purpose was merely to prevent wasteful duplication.

New Power Booklets Out

The Commerce Dept has released "Electric Current Abroad," a booklet describing service available in principal cities of about 150 countries. Copies are 25¢. The Federal Power Commission has issued the first annual supplement to "Hydroelectric Plant Construction Cost & Annual Production Expenses." The supplement is for 1957 and can be purchased for 50¢. Requests for the Commerce Dept and FPC publications should be mailed to U. S. Government Printing Office, Washington 25, D. C. Atomic Industrial Forum has issued its "1959 Atomic Industry Directory of Products, Equipment & Services." Write AIF, 3 E. 54th St., New York 22, N. Y.

Books

Books Recently Received

Electricity Undertakings of the World 1958-59, The Electrical Journal Red Book, Sixty-Eighth Edition. Published by Benn Brothers Limited, Bouverie House 154 Fleet Street, London EC4. 544 pages, illustrated.

Basic Electronics, 2nd Edition. By P. B. Zbar. Published by McGraw-Hill Book Co, 330 W 42nd St., New York 36, N. Y. 148 pages, illustrated. Price $2.25.

Sale-Leasebacks and Leasing in Real Estate and Equipment Transactions. By Harvey Greenfield and F. K. Griesinger. Published by McGraw-Hill Book Co, 330 West 42nd St, New York 36, N. Y. 107 pages. Price $15.00.

The Atom and the Energy Revolution. By Norman Lansdell. Published by Philosophical Library, Inc, 16 East 40th St, New York 16, N. Y. 197 pages, illustrated. Price $6.00.

Logical Design of Electrical Circuits. By Rene A. Higonnet and Rene A. Grea. Published by McGraw-Hill Book Co., 330 West 42nd St, New York 36, N. Y. 232 pages, illustrated. Price $10.00.

Topics in Electromagnetic Theory. By Dean A. Watkins. Published by John Wiley & Sons, Inc., 440 Fourth Ave, New York 16, N. Y. 111 pages, illustrated. Price $6.50.

Electrical Measurement Analysis. By Ernest Frank. Published by McGraw-Hill Book Co, 330 West 42nd St, New York 36, N. Y. 420 pages, illustrated. Price $8.75.

Electromechanical Energy Conversion. By David C. White and Herbert H. Woodson. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 637 pages, illustrated. Price $12.50.

Electrical Engineering: Theory and Practice, Second Edition. By William H. Erickson and Nelson H. Bryant. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York. 602 pages, illustrated. Price $8.00.

NEMA Standards Publication—Motors and Generators. Published by National Electrical Manufacturers Association, 155 East 44th St, New York 17, N. Y.

1958 Book of ASTM Standards: Part 1-Ferrous Metals; Part 2-Non-ferrous Metals; Part 9-Plastics, Electrical Insulation. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

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Rugged 5-year field test proves superiority of ACCO ALUMINIZED Strand

Convincing proof of ACCO ALUMINIZED Steel Strand's matchless ability to "stand up" in highly corrosive, heavy industrial areas is furnished by a 5-year field test recently completed by a leading Eastern power company.

A section of ACCO ALUMINIZED High Strength Guy Strand, installed in 1953, was removed and subjected to thorough examination, including various laboratory tests and measurements. The wire surface was covered with a formation of sulfide, oxide and soot; but, after scrubbing with soap and water, the aluminum coating was shown to remain *bright, smooth and unattacked* by the highly sulfurous atmosphere (*see photo*).

Loss of weight of the aluminum coating during the 5-year exposure proved negligible. Tests showed that the physical properties of the wire and coating continuity were exceptionally good. All in all, the determinations indicated that the ACCO ALUMINIZED Strand would give *many additional years of outstandingly satisfactory service.*

"Far Greater Life..."

In another test, the ability of PAGE ACCO ALUMINIZED Strand to withstand exposure to extreme salt atmospheres is proved, as revealed by the following excerpts from a letter written by an official of a public water authority:

"We have obtained excellent results with ACCO ALUMINIZED guy wire. We ran several tests in the Metropolitan Area where there was exposure to the salt atmosphere from the sea. We used galvanized strand and your (ACCO ALUMINIZED) strand on the same poles.

"Results indicated *far greater life* for ALUMINIZED. After 8 months, the galvanized was rusted, whereas the ALUMINIZED showed no signs of oxidation or deterioration. As a result of our tests, our original purchase of ACCO ALUMINIZED guy wire was followed by another, and larger, order. This wire is used where we must have a product with high resistance to corrosion."

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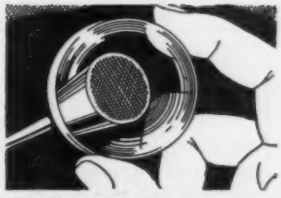
of ACCO ALUMINIZED STEEL

In 1954, PAGE announced to the industry the successful development of a process for combining two time-tested but dissimilar metals, on a production basis, into a revolutionary new wire for increased resistance to corrosion: *Steel* for strength coated with *Aluminum* for corrosion-resistance.

Early laboratory results on accelerated Salt Spray testing which were favorable to ACCO ALUMINIZED over galvanized by a wide margin, are now being confirmed by results of field tests on installations of ACCO ALUMINIZED Strand exposed to the elements over a period of 3 to 5 years. The remarkable performance of the product in both industrial and marine atmospheres is now assured.

Now PAGE offers ACCO ALUMINIZED Steel Strand for guy wire, ground wire and messenger wire. Available in a wide range of sizes, in 3-, 7- and 19-wire construction. It can be used with Preformed Guy-Grip dead-ends made of ACCO ALUMINIZED Wire, or with galvanized pole hardware.



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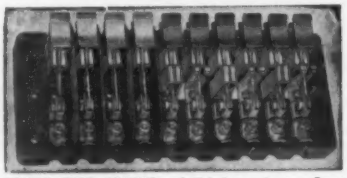

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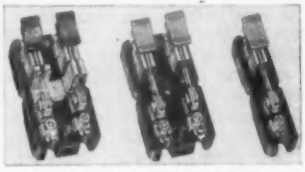

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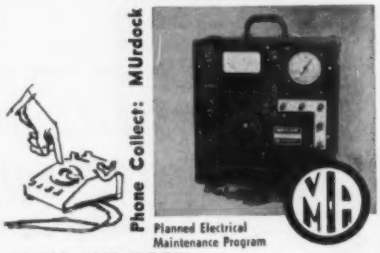

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What this development will mean in comfort,
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for the larger life of the spirit,
we have only begun to realize."

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Capital Spending

(*Continued from page* 77)

ever reported for this purpose in a McGraw-Hill Survey.

Research expenditures, though they make up a smaller part of capital investment, furnish an even more encouraging sign. One of the most important economic developments of 1958 was the decision by U. S. business to hold firm on plans to hike research outlays despite the recession's impact on sales and profits.

R&D expenditures for 1958 totalled $8.2 billion—a new record, and 12% over the 1957 total.

This year business is planning another large increase, to a total of more than $9 billion. Long-range plans now call for a rise to $10.6 billion by 1962, but the steep upward trend of R&D expenditures in recent years hints that this figure is almost sure to be exceeded.

More than 95% of the research performed by business is done by manufacturing companies; and among these industries, electrical equipment ranks second only to aircraft in total R&D expenditures.

Electrical equipment makers are expanding their R&D spending the fastest of all—14% this year (to $1.6 billion) and another 33% by 1962. Other long-range leaders are instruments and paper.

5% Going for Research

In all, manufacturing companies are planning to invest $523 million in new research facilities in 1959—or 5% of their total outlays for new plants and equipment.

For the long run, industry's expanding program of research and development offers the promise of new products, new processes, and the need for new producing facilities to take advantage of these advances.

Another key to sustaining the rise in capital spending, of course, is growth in business. Manufacturing companies, on the average, were operating at 80% of capacity at the end of 1958. Since industrial production has continued to increase, the present rate is probably higher, but most industries are probably still operating below desired rates.

It is a measure of confidence in the U. S. economy that manufacturing companies anticipate a 9% increase in their sales this year and

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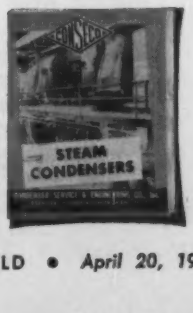


another 18% increase in the years 1960-1962. If sales advance as rapidly as expected, more capacity will be needed. Meanwhile, plans for expansion are being held to a relatively modest rate of 4% a year —not quite half the expected increase in sales, but enough to make manufacturing capacity at the end of 1962 more than 80% greater than it was in 1950.

Employment is not expected to rise as rapidly as sales. By far the largest increase in manufacturing employment this year is expected by auto, truck, and parts companies (16% over 1958). From 1959 to 1962, electrical machinery expects the biggest increase (20%).

In the non-manufacturing industries covered by the survey, only mining and commercial companies expect to increase employment more than 2% this year. And for 1960-1962 only commercial firms see yearly gains of more than 2%.

Reporting electric utilities expect employment to increase by 1% this year and 3% from 1959 to 1962. Comparable sales increases expected are 8% and 19%.

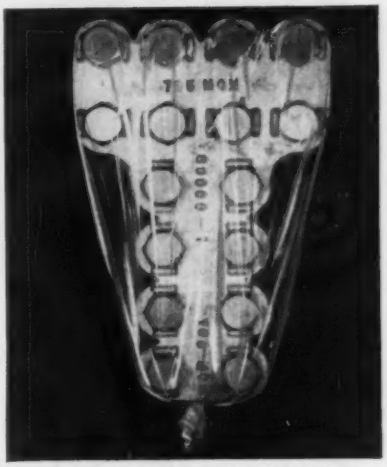
The relatively greater increases in sales than in employment imply that there will be substantial increases in productivity over the four years. This year the indicated gain would be about 6%—which is in line with previous estimates of the rapid increase in productivity per manhour during the recovery period.

More Depreciation Due

Funds available to U. S. business through annual deductions for depreciation will increase more than 20% between 1958 and 1962, according to the survey. Manufacturing corporations estimate their depreciation deductions will rise 17%. This will provide strong support for capital expenditures, since these deductions now account for about two-thirds of capital spending and are by far the largest source of corporate funds for new plants and equipment.

Further liberalization of the tax law on depreciation would result in greater capital expenditures, said 45% of the companies participating in the survey. Only 4% of electric utilities agreed in this, although 96% of those reporting noted that higher depreciation allowances would allow them to rely less on outside funds.

BOLTED ALUMINUM POWER CONNECTORS



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Designers and Manufacturers of
Power Switching Equipment and Special Electrical Devices

J. E. JOHNSON, Philadelphia Electric Co, describes his company's high-silicon iron anodes, like the one he's holding, which are used for cable-sheath protection. F. E. Kuhlman, left, Consolidated Edison Co, was the session's chairman

D. B. SIMMONS, Houston L&P Co, discusses water-pipe-ground current and National Electrical Code provisions

Cites Cable Anti-Corrosion Steps

Philadelphia Electric speaker tells NACE at Chicago convention of anode installation to prevent cable-sheath corrosion

Anodes of high-silicon iron installed in one duct in a duct bank provide effective cable-sheath corrosion protection for some Philadelphia Electric Co cables, the Utility Industry Session of the National Association of Corrosion Engineers was told at the annual convention March 19 in Chicago.

Assure DC Flow

Each of the special anodes has a copper wire running through the short length of high-silicon iron, and electrical connectors join the anodes to the wire, said J. E. Johnson. He added that the wire between anodes is insulated. Experiments, he said, showed that polyethylene insulation on the wire performed satisfactorily, but that polyvinylchloride insulation deteriorated when silt conditions prevailed in the ducts.

A rectifier connected to the cable sheath and the system of anodes, Johnson continued, assures the flow of direct current in the proper direction for protection of the cable sheath. Experiments to determine optimum current for adequate protection, he said, resulted in selection of a 15-ma value, and the best spacing was found to be 15 ft. This protective system, installed in 18,000 ft of duct system at a cost of $30,000, protects cables with a replacement value of $400,000.

Denies Damage to Pipes

Tests to determine the probability of damage to water pipes from electrolytic action showed that current flow was from ground to the water pipes, said D. E. Simmons, Houston Light & Power Co. Such flow doesn't damage the pipes. Simmons said that the tests showed that current picked up by pipes in one home flowed through the pipes to a neighboring home and to the power system through the electric service ground connection to the water pipe. Installation of a cathodic protection system, including an insulating joint in the water pipe, Simmons said, not only defeated this normal and harmless flow of current, but also destroyed the effectiveness of water pipe grounds as provided for by the National Electrical Code.

Protects in Urban Area

A distributed anode system protects 21 sheath miles of cable in an urban area, said James P. McArdle, American Telephone & Telegraph Co. Soil resistivity conditions were not uniform in the area, and there were other sub-surface structures.

Anodes were installed, one to a pole, at the base of selected poles along a pole line. Anodes were interconnected by a continuous length of insulated wire on the pole line. Three small rectifiers, connected to the system, supplied a total of 8.3 amp. The system gives adequate protection to cable sheaths, he said.

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Readers Forum

Double Barreled Entry

To the Editor:

Your recent column describing the "Electrical Dreamers Club" has encouraged me to apply for membership by submitting an idea for building an upholstered armchair as a "warm chair" by installing heating elements with a temperature control dial and neon signal lamp on the end of one arm. This would be a great comfort to invalids and old people, and might even be popular with other members of the family.

Now here is an idea which might qualify me for the "Crackpot Division" of your club.

I propose to solve the parking problem in congested areas by an "automatic parking system." Usually large parking lots can be made available perhaps a mile away from a shopping center, or, in the case of workers, from the main entrance to their place of employment.

The technology for automatic control of automobile on turnpikes has already been worked out using buried cables in the roadway for guidance. I propose a system whereby a car is left at a convenient location, locked, and then with a key inserted from the outside put on "automatic pilot control." The car then proceeds under its own power, following a guided lane to a distant lot where it finds a vacant place and parks itself.

To retrieve the car, a code number is dialed, starting up the car and guiding it back to the place where the driver waits for it.

More power to your "Electrical Dreamers Club"!

W. M. Leeds, Mgr.
Swgr, LRMD Engr. Dept.

Westinghouse Electric Corp
East Pittsburgh, Pa.

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No. 14 in a series

Right off the Wire

21. Simplex takes pleasure in extending an invitation to old friends and new to visit their Booth #1611 at the American Mining Congress Coal Show, Cleveland Public Auditorium, May 11th through May 14th.

&

22. A 600-passenger ocean liner which will run on hydrofoils is in the design stage.

&

23. The first rocket-camera has been used to photograph cloud formations over the Atlantic.

&

24. An electrostatic device can separate particles of different materials. It can sort flour milling stocks, separate grains of different minerals and distinguish between healthy and unhealthy seeds.

&

25. A new magnetic recording tape has a protective lamination over the oxide to prevent wear.

&

26. A solid electrolyte battery has been developed that is said to be suitable for commercial production.

&

27. There are now three large offices where individual desk telephones can be reached from the outside by direct dialing.

&

28. Mercury batteries reduce the weight of a clock radio, made especially for travelers, to less than three pounds.

&

29. Stereophonic radio has hitherto required both AM and FM for transmission. A new method uses AM only.

&

30. The light from a recently patented underwater flash bulb is of such brief duration that fish are not frightened by it.

31. Crevasses in glaciers or ice fields can be detected by a device that can be carried in an airplane. It measures the difference in heat radiation between solid and hollow ice and records on film.

&

32. Tissues, skin, veins, arteries and circulating blood are all realistically simulated in an imitation human body designed for first aid training.

&

33. A heating element for use in floors or walls is made of paper in which copper strips are embedded.

&

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

&

34. A patent for an acoustical method of stimulating the flow of oil wells has been issued. The sound waves will actually shatter rock.

&

35. For the first time, an airplane has been guided over land by a missile system using radar to scan a photograph of the terrain.

&

36. An attachment for a telephone intended for use by a number of people kills germs with ultraviolet light.

&

37. Electroluminescent panels that emit cool light from a flat glass plate are now made in six colors.

&

38. Entirely new principles of heating and cooling are used in a unit that keeps foods hot or cold. It is mounted on wheels, uses batteries for power and can be rolled anywhere in or out of the house.

39. Ticker tape is being projected on a screen with letters and figures two feet high at the New York Stock Exchange.

&

40. A method of bouncing short waves off man-made reflectors in the sky has been patented. It can be used for radio or television.

&

41. America's annual bill for corrosion is 6 billion dollars, according to recently revised figures. Simplex Wire & Cable Co. has prepared a bulletin on this expensive problem and the most effective means of combating it. Write for Bulletin 1033.

Thirty-eight years ago Simplex Wire & Cable Co. announced the TIREX line of rubber-jacketed and insulated cords and cables to the mining industry. These cables featured the Simplex developed "cured-in-lead" process which produced a dense, tough and yet highly flexible sheath. To an industry plagued by severe operating conditions, the TIREX line of power and control cables provided unmatched dependability and service life.

Today, manufactured with the same proven "cured-in-lead" process and embodying vastly improved insulating and jacketing compounds, Simplex TIREX is still the first choice wherever operating conditions are at their worst.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

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Highest quality cables for: Mining
Power & Lighting • Construction
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INNOVATIONS IN FLUID HANDLING: #1 OF A SERIES
STEAM GENERATING GROUP
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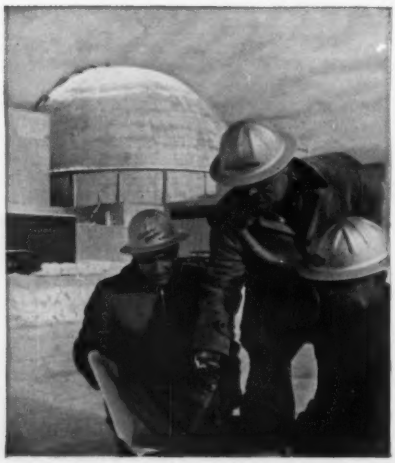
As the manufacturer of all major components of the fluid handling group (pumps, condensers, deaerators, ejectors) Worthington has a reservoir of experience and knowledge that can benefit you.

NUCLEAR CONDENSER

Dresden unit is tailored to special needs of nuclear plants



Engineers of General Electric, Worthington and Bechtel Corporations worked together closely with Commonwealth Edison on new Dresden Station.

Four major problems faced Worthington in the design of a 120,000 sq. ft. condenser for the Dresden Nuclear Power Station being built by General Electric Co. for Commonwealth Edison Co. and the Nuclear Power Group, Inc. They were: (1) necessity of handling full output of dump steam, (2) quantities of free gases in the steam, (3) maintaining condensate purity, and (4) providing radioactive decay time for the condensate.

Worthington engineers, working in close cooperation with the customer, his design engineers and contractors, solved these problems. To handle dump steam, pressure breakdown devices were installed in the condenser itself and in a special "blister" on one side of the condenser. An extra large ejector was used to handle quantities of free gases. And to maintain condensate purity double tube sheets were used and special deaeration features were provided.

Radioactive decay time was provided by means of the special hotwell which is baffled to make the transit time of the condensate long enough to allow short-lived radioactive impurities to decay to lower levels.

This typical example shows you how Worthington applies its experience as a manufacturer of all major components of the fluid handling group in solving the problems of one particular element. To put this progressive "know how" to work on your power plant problems, conventional or nuclear, contact your nearest Worthington district office. Or write to Worthington Corporation, Section 45-8, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantford, Ontario.

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